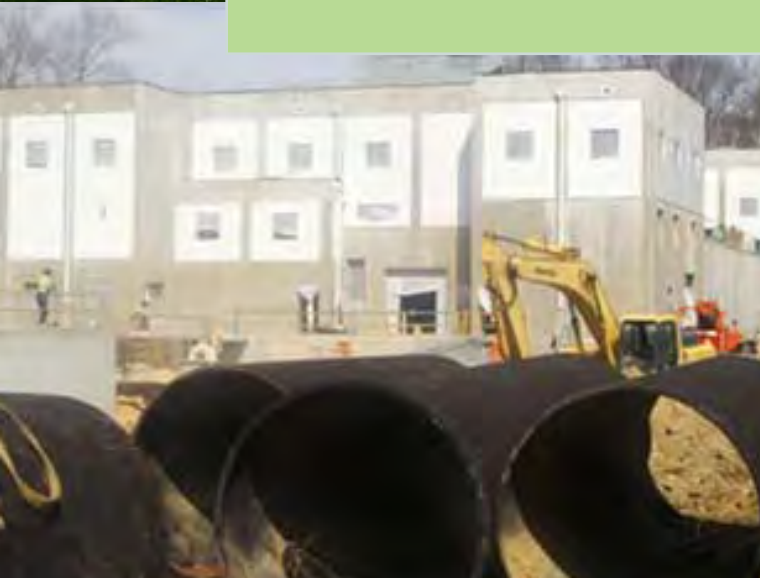




MASTER PLAN FOR WATER AND SEWERAGE, 2011 AMENDMENT





HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS

3430 Courthouse Drive ■ Ellicott City, Maryland 21043 ■ 410-313-4400

James M. Irvin, Director

jirvin@co.ho.md.us

FAX 410-313-3408

TDD 410-313-2323

ENGINEER'S STATEMENT OF CERTIFICATION

July 2011

The water and sewerage projects proposed in the Howard County Master Plan for Water and Sewerage are adequate to meet the future system requirements as projected. The Master Plan for Water and Sewerage has been prepared based on population estimates, basic policy edicts and other basic data provided by the Howard County Office of Planning and Zoning, the Department of Public Works and the Howard County Health Department.

James M. Irvin
Director

4/17/12

Date



HOWARD COUNTY DEPARTMENT OF PLANNING AND ZONING
3430 Courthouse Drive ■ Ellicott City, Maryland 21043 ■ 410-313-2350

Marsha S. McLaughlin, Director

www.howardcountymd.gov

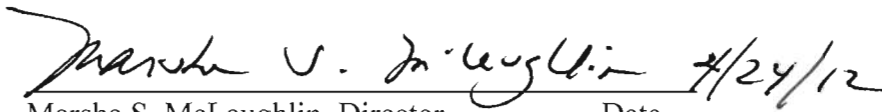
FAX 410-313-3467

TDD 410-313-2323

STATEMENT OF CERTIFICATION

April 2012

The water and sewerage projects and the water and sewer service areas proposed in the Master Plan for Water and Sewerage for Howard County are consistent with the Howard County General Plan, adopted on November 6, 2000 by the Howard County Council. The Master Plan for Water and Sewerage has been developed based upon land use objectives shown in the General Plan and population estimates provided by the Department of Planning and Zoning.


Marsha S. McLaughlin, Director Date 4/24/12



Department of Public Works
BUREAU OF UTILITIES

Stephen Gerwin, Bureau Chief

March 23, 2012

Maryland Department of the Environment
Water Management Administration
1800 Washington Blvd.
Baltimore, MD 21230-3511

Attn: Virginia Kearny
Deputy Director

Re: Final Plan Submission
Howard County 2011 Water and Sewer Master Plan

Dear Ms. Kearny:

Enclosed is our submittal of four (4) CD's of the Final 2011 Water and Sewer Master Plan for Howard County, as requested by your Office. Upon approval, we will provide the Department additional copies upon request.

I would like to draw your attention to the following modifications to the Plan in response to your letter of February 13, 2012 on our Draft Plan submission:

- 1) The second paragraph of MDE's comment letter points out that in chapter 4, page 4-1 of the Plan, there is a reduction of public sewer system service for the County's population from 86% to 84% from 2010 to 2035. Chapter 2, Table 1B shows the population projections by drainage basin for the Planned Service Area versus the total County population in 5 year increments from 2010 to 2035. The actual percentages served by public sewer are 85.3% and 84.8%, respectively, for 2010 and 2035. These population projections are based on current zoning projections for anticipated lot development density under present regulations. The County believes these differences in percentages of population served are negligible and effectively represent no change in the level of service provided by the public system, and that the bulk of development capacity remains within the Planned Service Area. We will, however, correct the percentages on page 4-1 to more accurately reflect the totals shown in the tables.

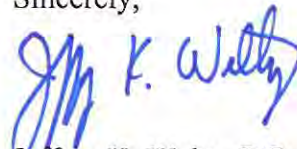
- 2) The Maryland Department of Planning expressed concern over Tier II watersheds that overlap with portions of the Planned Service Area (PSA). Since water quality protection with regards to Tier II waterways and development management have been addressed in the 2010 Water Resources Element, the WRE has been included as an appendix to the Plan and referenced in Chapter 1.
- 3) The Maryland Department of Natural Resources (DNR) commented that County water and sewer service areas are present in both the Patapsco Lower Branch Watershed and the Little Patuxent River Water shed, both of which are Stronghold Watersheds for the protection of Maryland's aquatic biodiversity. The comment goes on to note that special protection of these areas is necessary to ensure the persistence of these imperiled fauna throughout the State.

Howard County is aware of these conditions and understands that permit approval for a variety of water and sewer projects in these areas, both initiated by Developers and capital improvement projects initiated by the County, will be subject to the added scrutiny for the protection of Rare, Threatened, and Endangered Species (RTE) areas within the County. The County is currently in the process of finalizing the General Plan 2030 in which these issues are addressed.

- 4) Included with this submittal packet is the Checklist for the Submittal of Water and Sewerage Plans as requested by your comment letter.
- 5) Final hard copies (and additional electronic, if required) of the Plan will be distributed, based on MDE's requirements, upon receipt of final approval.

Please direct any questions you may have regarding the submission to either Don Campbell (410) 313-1438; or myself at (410) 313-4974. Thank You.

Sincerely,



Jeffrey K. Welty, P.E.
Deputy Chief
Howard County Bureau of Utilities
410-313-4974

Attachment

Cc: James N. Irvin, Director, Department of Public Works
Stephen Gerwin, Chief, Bureau of Utilities

I acknowledge receipt of the Final 2011 Water and Sewer Master Plan

Virginia Keary
Deputy Director
Water Management Administration

Date

CHECKLIST

FOR THE PREPARATION AND SUBMITTAL OF WATER AND SEWERAGE PLANS

COMAR 26.03.01 REQUIREMENTS

The purpose of this Checklist is to assist local governments in the preparation and submittal of Water and Sewerage Plans. However, this Checklist does not supercede the requirements of COMAR 26.03.01 or the Annotated Code of Maryland, Environment Article, Subtitle 5.

The information submitted in County Water and Sewerage Plans must be consistent with the information submitted in Water Supply and Wastewater Capacity Management Plans.

26.03.01.01 **Definitions: See COMAR attachment.**

26.03.01.02 **General Provisions**

- | | |
|----------------|---|
| <u> X </u> | 1. Is the plan consistent with county comprehensive planning? |
| <u> N/A </u> | 2. Does the plan incorporate subsidiary plans? |
| <u> X </u> | 3. Did the governing body review the plan at least annually? <i>Done semi-annually.</i> |
| <u> X </u> | 4. Was the report of the annual review (with amendments to or revisions of the plan) submitted to MDE? |
| <u> X </u> | 5. Is a statement attached indicating that comprehensive planning agencies were consulted? <i>See attached.</i> |
| <u> X </u> | 6. Were public hearings held on all amendments and revisions to the plan?
<i>See attached.</i> |

26.03.01.03 **Sequence of Steps for the Submission of County Plans**

- | | |
|--------------|---|
| <u> X </u> | 1. Submit the preliminary plan to the comprehensive planning agency, MDP, DNR and the Department. |
| <u> X </u> | 2. Receive all agency comments from MDE, which will act as coordinator. |
| <u> X </u> | 3. Hold a public hearing. <i>See #6 above.</i> |
| <u> X </u> | 4. Formally adopt the plan. <i>See attached.</i> |
| <u> X </u> | 5. Prepare the plan in final format. |
| <u> X </u> | 6. Submit 4 copies of the final plan to the Department, 1 copy to DNR, and 1 copy to MDP. <i>See attached.</i> |
| <u> X </u> | 7. Within 6 months after submission, the Department will approve, approve in part, or disapprove the final plan. <i>Accepted.</i> |
| <u> X </u> | 8. After approval, print and distribute at least 50 copies of the plan. <i>Accepted.</i> |
| <u> X </u> | 9. After approval, distribute 4 copies of the approved plan to MDE and 4 copies to DNR. <i>Accepted.</i> |

If applicable, please provide the chapter and page references from the County Plan for each item listed below. For example, include "Intro-2", "II-4", or "IV: 6-10" in the left-hand column.

26.03.01.04

Minimum Contents of Plans

X

Each adopted plan shall be arranged with an introduction and a minimum of 4 chapters.

Introduction

X

1. Statement certifying that the county governing board has officially adopted the plan. See Page 1-23 in the Plan document.

N/A

2. Statement certifying that the plan incorporates subsidiary plans; and that the governing body gave notice to subsidiary entities and provided an opportunity to be heard.

X

3. Statement certifying that the sections covering engineering aspects of water and sewerage projects have been prepared and reviewed for adequacy by a registered engineer licensed in the State.

X

4. The letter of approval from the Department.

Pending MDE approval.

Chapter I

X

1. A statement of the goals of the county consistent with county comprehensive planning.

X

2. A brief discussion, with charts, of the organization of the county government as it relates to the management of water supply and sewerage facilities.

Chapter II Background Information

1. Physical -

X

a. Maps showing aquifers, soil drainage characteristics, topography, ground water and surface water patterns.

X

b. A map or table showing water quality criteria in the county.

2. Population -

X

a. General maps showing present and projected population distribution and density.

X

b. **Table No. 1: County Population Projections**

Including county projections, State projections, and other projections for a period of three decades.

X

 X

 X

3. Land Use -

- a. Maps showing existing land use, zoning, and the adopted comprehensive development plan for the county.
- b. **Table No. 2: Land In County**
 Acres and % Total Acreage for several Land Use, Zoned Land, and Comp. Plan categories.
- c. Institutions and Facilities -
 Map showing existing and proposed major public institutions, such as schools, hospitals, correction facilities, government complexes.
 Table showing the approximate populations of the facilities.

Chapter III Water Supply Systems

X

 X

 X

 X

 X

 X

1. Tables, maps, charts, graphs, descriptive information, and other matter regarding these systems.
2. Discuss ground and surface water resources including the quality and potential quantity of these sources.
3. Summaries of existing and projected water demands.
4. Summaries of existing sources of pollution or contamination related to water supplies.
5. A discussion of alternatives and rationale used in determining the means of providing future water supplies.
6. For every water service area, the following should be discussed or shown:
 Operating agency
 Rated and actual production
 Type of treatment
 Location
 Operation and maintenance cost
 Proposed means of financing improvements
 For any proposed new water source: A summary of the environmental impact of its development
 For any proposed new water supply source: Outline efforts to reduce demands
7. **Table No. 3: Projected Water Supply Demands and Planned Capacity**
 (The table provided for intervals of ten years over a three-decade period.)
 For each service area:
 Total Population
 Served Population
 GPCD (gallons per capita day)

X

X

8. Table No. 4: Inventory of Existing Community System Wells

Well Name or Number

Aquifer

Coordinate Location

Depth of Well

Diameter of Well

Pumping capacity

Water Quality

 X

9. Table 5: Inventory of Existing Impounded Supplies

List of Owners, grouped in Municipal, Industrial, and Private Community Categories

Crest Elevation (above sea level)

Total Length of Dam

Flooded Area of Crest Elevation

Length of Shore Line at Crest Elevation

Area of Land Owned

Water Overflowed Crest for First Time

Capacity of Reservoir

Safe Yield (MGD)

Average Daily Withdrawal (MGD)

 X

10. Inventory of other surface water supplies showing initial and planned withdrawals (MGD).

 X

11. Table 6: Inventory of Existing Water Treatment Facilities

List of Owners, grouped by Municipal (public), Industrial, and Private Community / Industrial categories

Water Source

Type Treatment

Plant Coordinate Location

Rated Plant Capacity (MGD)

Average Production (MGD)

Max. Peak Flow (MGD).

Storage Capacity (MGD)

Planned Expansion MDG/Dates

Method of Sludge Disposal

Operating Agency

X

12. Table 7: Inventory of Water Problem Areas Service area
Location
Population – Served, Unserved, Total *See attached.*
Nature of Problem

X

13. Table 8: Immediate, 5 and 10-year Priorities for Water Development
Fiscal Year and Project Number
County Priority Assigned
Coordinate Location
Description
Estimated Costs (Total, Federal and/or State, Local)
Local Costs
Project Status - Construction Start
Immediate Priority Projects
5 and 10-Year Period Projects

Chapter IV Sewerage Systems

X

1. Indicate locations of proposed points of waste discharge.

X

2. Show how conformance of existing and programmed sewerage facilities meet or will meet the effluent limitations specified in COMAR 26.08.03.01.

X

3. Contain a summary of each available point of discharge evaluation, specifically those parts pertaining to protected water uses.

X

4. Discuss the rationale of selecting a planned alternative for any proposed treatment facility, pumping station, or interceptor.

X

5. For every service area and community system, the following should be discussed:

Operating agency

Design average and peak flows

Whether combined or separate collection systems

Level and type of treatment given

Sludge disposal plans

Condition of treatment and transmission facilities

Operation and maintenance costs

Proposed means of financing improvements

X

6. Table No. 9: Projected Sewerage Demands and Planned Capacity

Provide the following columns of information by service area for the next three decades:

Population: Total, Served, Unserved

GPCD (gallons)

Capacity: Demand, Planned

X

7. Table No. 10: Inventory of Existing Sewage Treatment Plants

Owner

Treatment Type

Coordinates

Occupied Acres

Vacant Acres

Point of Discharge

Max. Capacity Secondary

Max. Capacity Advanced

Existing Capacity

Average Flow

Peak Flow

Abandonment Date

Operating Agency

X

8. Table No. 11: Inventory of Problem Areas

Service Area *See attached.*

Problem Description

Location

Population

Acres

Treatment Capacity

Treatment Demand

Planned Correction

N/A

9. Table 12: Water Quality Problems due to Storm Drainage Outfalls and to Non-point Sources

Service Area *See attached.*

Problem Description

Location

Reach Affected

X

10. Table 13: Immediate 5 and 10-year Priorities for Sewerage Development

Fiscal Year and Project Number
County Priority Assigned
Coordinate Location
Description
Costs: Total
 PL 660 Eligibility
 Other Federal
 Local

Project Schedule: Preliminary Plans
 Start Construction
 Construction

N/A

11. Marinas: The plan shall include an inventory of problem marinas and include basic planning concepts for sanitary facilities at marinas.

Technical Requirements of the Plan

X

1. Textual materials, tables, charts, graphs, and other illustrations shall be prepared on 8 ½ X 11 inch stock or any other size that can be folded for inclusion in the binder.

X

2. The Maryland Coordinated Grid System shall be used to determine place locations.

X

3. All projections shall be made by the decade year.

X

4. Two maps of the entire county to a scale of approximately 1 inch equal to 1 mile showing, in general, areas served or to be served with community facilities. One map should be for sewerage facilities and the other water supply facilities.

X

5. Two sets of detailed maps (one for water facilities and the other for sewerage facilities) of each portion of the county shall be prepared on a minimum scale of 1 inch equals 2,000 feet and in sufficient number to show actual areas served or to be served.

X

6. Amendments or revisions shall be prepared so that the new or additional material may be inserted in the binder in the appropriate places to provide a continuously updated and current comprehensive water and sewerage. Each sheet of the amendment or revision should be dated to show when the change became effective.

N/A

7. Measurements can be converted to their metric equivalence when applicable.

X

8. Delineate on the maps existing or proposed and planned community and multi-use water and sewerage facilities, including wells; reservoirs; intakes; transmissions and feeder mains; storage facilities; interceptor and trunk sewers; pumping stations; force mains; treatment works; outfall sewers; and service areas. Show sizes, or capacities, or both, where appropriate.

<u>X</u>	9. Delineate on the maps area served by community and multi-use water and sewerage systems which are either existing or under construction. The actual bounds of areas served by these systems should be clearly indicated. The areas so shown in this category shall be shown in Table 14 and shall be referred to as W-1 for water systems and S-1 for sewerage systems.
<u>N/A</u>	10. Table 14: Water and Sewerage Map Symbols , includes (1) symbols for existing and planned water or sewerage treatment plants; water or sewerage pumping stations; water storage tanks; wells; springs; reservoirs; interceptors, outfalls, raw and treated water transmission mains; force mains; and laterals and feeder mains; and (2) identifiers for existing and planned service areas. <i>See attached.</i>
<u>X</u>	11. Delineate on the maps, areas to be served by extensions of existing community and multi-use water and sewerage systems, which are in the final planning stages. The areas so shown in this category shall be shown in Table 14 and shall be referred to as W-2 for water systems and S-2 for sewerage systems.
<u>X</u>	12. Delineate on the maps where improvements to construction of, new community and multi-use water supply and sewerage systems will be given immediate priority. The areas so shown in this category shall be shown in Table 14 and shall be referred to as W-3 for water systems and S-3 for sewerage systems.
<u>X</u>	13. Delineate on the maps areas where improvements to or construction of, new community and multi use water supply and sewer systems will be programmed for the 3 to 5/6 year period. The areas shown in this category shall be shown in Table 14 and shall be referred to as W-4 for water systems and S-4 for sewerage systems.
<u>X</u>	14. Delineate on the maps those areas where improvements or construction of, new community and multi-use water supply and sewerage systems are programmed for inclusion within the 6/7 through 10-year period. The areas so shown in this category shall be as shown in Table 14 and shall be referred to as W-5 for water systems and for sewerage systems.
<u>N/A</u>	15. Other maps symbols shall be as shown in Table 14.

26.03.01.05

Individual Water Supply and Sewerage Systems

<u>X</u>	1. Individual systems not permitted where community facilities are available.
<u>X</u>	2. Interim individual systems are allowed.
<u>X</u>	3. Individual systems are allowed where community systems are not planned.

26.03.01.06.1

Flow Data

X

1. Table 15: Flow Data - Wastewater Treatment Plants

Name or service area

Design - Hydraulic (mgd)

Design - Organic (ppm)

Flow - Avg. Day (mgd)

Flow - Max. Day and Date

Development Occupancy Units - Existing

Development Occupancy Units - Anticipated - Under Const.

Development Occupancy Units - Anticipated - Not Under Const.

Building Permits for Unexpired PWAs

X

2. Table 15 A: Flow Data - Collector Sewers, Interceptors, Pumping Stations and Force Mains Sewer

Name or type

Diameter

Flow - Avg. Day

Flow - Design

Number of Pumps

Pumping Station

Capacity of Each Pump

Normal Pumping Capacity

Avg. Day Pumpage

Force Main

Max. Day Pumpage and Date

Diameter

Design Flow

26.03.01.07

Compliance with Maryland Water Conservation Plumbing Fixtures Act Documentation shall include:

See attached.

X

1. County agency responsible for enforcement.

X

2. Summary of county programs:

a. Procedures concerning certificate of occupancy;

b. Actions concerning sale of fixtures; and

c. Procedures for record plats and permits.

X

3. Description of changes to achieve compliance with MWCPFA.

26.03.01.08

X

Financial Management of Public Sewerage Systems

1. Contents of financial management plan:

Description of financial roles and relationships.

Completed Schedule FS.

X

2. Before issuance of a State permit for a new public sewerage system:

Financial management plan must be adopted as part of the county plan and approved by the Department.

X

3. The proposed system has been described in a plan amendment adopted by the governing body and approved by the Department. *See attached.*

X

4. Each plan is required to treat each public sewerage system as a separate entity.

X

5. Timing of financial management plan submittals.

X

6. Requirement to send instructions for Schedule FS to county contacts.

X

7. Additional information, if required:

Inventory of plant and equipment

Documentation that rates are sufficient to meet O&M costs

Billing procedures

Bad debt

Planned projects and anticipated financing

Plant replacement and anticipated financing

Escrow accounts

Balance sheet

Checklist for the Preparation and Submittal of Water and Sewerage Plans

Attachment

- 26.03.03.02 #5. Draft copies of the 2011 Howard County Water and Sewer Master Plan were submitted to the Howard County Department of Planning and Zoning, Utility Design Division, and the Bureau of Health.
- #6. The 2011 Howard County Water and Sewer Master Plan will go through public hearings via the County Planning Board, the County Public Works Board, and the County Council subsequent to MDE approval.
- 26.03.01.03 #4. The 2011 Howard County Water and Sewer Master Plan will be adopted by resolution of the County Council upon approval of MDE and recommendation by the County Planning Board and the County Public Works Board.
- #6. Per conversations with MDE, four electronic copies of the Plan have been submitted to the Department.
- 26.03.01.04 Chapter III, #12. The population served for each of the areas served in Table 7 is maintained by the County Bureau of Health.
- Chapter IV, #8. Table 11 lists an inventory of problem areas outside the County's Metropolitan Water and Sewer District. These properties are served by individual on-site septic systems.
- Chapter IV, #9. Remediation efforts are addressed in the Water Resourced Element contained in Appendix 8, and addressed under other Howard County stormwater efforts.
- Technical Requirements, #10. Legends are included on each map depicting symbols.
- 26.03.01.07 #1 through #3. Howard County adopts the National Standard Plumbing Code with Howard County Amendments for its compliance with MWCPFA.
- 26.03.01.08 #3. The 2011 Howard County Water and Sewer Master Plan will be adopted by resolution of the County Council upon approval of MDE and recommendation by the County Planning Board and the County Public Works Board.

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Immediate, 5-Year, 10-Year, and Comprehensive Priorities for Sewer System Development Map

CHAPTER 1

OBJECTIVES AND ORGANIZATION

Requirements:

Title 9, Subtitle 5 of the Environment Article of the Annotated Code of Maryland requires that Howard County triennially review and adopt a Report of the Review and Amendments to the Master Plan for Water and Sewerage. Responsibility for implementation of Title 9 has been assigned to the State of Maryland's Department of the Environment which has adopted required Regulation (COMAR 26.03.01 - Regulations for Planning Water Supply and Sewerage Systems). Howard County Code (Subtitle 1. Public Utilities, Section 18.100A) establishes general procedures for this Howard County Master Plan for Water and Sewerage. Howard County has formulated the Master Plan for Water and Sewerage within the framework of these regulations.

"Semiannual Amendments" may also be prepared to amend the Master Plan for Water and Sewerage more frequently than the regulations require. These Semiannual Amendments must also be prepared in accordance with the Environment Article of the Annotated Code of Maryland and COMAR 26.03.01. Usually, the following types of revisions would be incorporated into the Master Plan for Water and Sewerage through the Semiannual Amendment process:

1. Changes in capital projects related to the Annual Capital Budget, the Ten Year Capital Improvement Program, or completed engineering studies.
2. Entry of properties into the County's Metropolitan District.
3. Changes in service area priorities.
4. Changes in the water and sewer planned service area

The Maryland Department of the Environment processes construction permit applications for water and sewerage facilities to serve proposed development in the Planned Service Area expected to be served by public water or sewer within five years, as shown on the facilities maps in Chapters 3 and 4. Permits are issued

provided all local and state requirements and regulations have been satisfied, and adequate system capacity is reserved.

In accordance with State law, construction permits can only be issued for development which is consistent with this Master Plan. Since construction permits are valid for a three year period, except under special conditions specified in the Plan, the Maryland Department of the Environment has interpreted the law to mean that it would be inconsistent with the Plan to issue a permit for development of a property not expected to be served by public water or sewer for more than five years. Before issuance of a construction permit for proposed development of a property designated in the 6 to 10 year or comprehensive service priority, where specified special conditions are not applicable, an amendment for the Master Plan for Water and Sewerage must be developed and approved which assigns the property a 0 to 5 year service priority designation.

Objectives:

The Master Plan for Water and Sewerage is prepared with the intent of accomplishing the following objectives:

1. To further the health and welfare of citizens residing and/or working in Howard County through the development of adequate water and sewer systems.
2. To support County development policies including implementation of the General Plan through the timely completion of water and sewer facilities to accommodate future growth.
3. To provide a framework for the scheduling and prioritizing of water and sewer projects based on evaluation of existing facilities usage, public health considerations and projected growth patterns.

To aid in evaluating future growth and related system demands, Howard County's population has been projected through the year 2035. The General Plan for Howard County, adopted in November 2000 and including amendments through 2010, including the Water Resources Element Amendment, the Downtown Columbia Plan Amendment, the Annual Development Monitoring Report, and the expected water demands and wastewater flows have been reviewed and findings included. The General Plan update (through the Year 2030) is currently in preparation and is anticipated to be finalized later this year. Other law, policies, regulations, and planning documents are considered in the triennial update of the Master Plan. These include:

1. Policies relating to inclusion of properties in the Metropolitan District
2. Howard County Code, Title 18, Subtitle 12- Shared Sewage Disposal Facilities
3. Water and Sewer System Capacity Allocation Policy (Section 18.122B of the Howard County Code)
4. Subdivision and Land Development Regulations (Section 16 Subtitle 1 of the Howard County Code)
5. Howard County Plumbing Code
6. Maryland Department of the Environment Regulations (COMAR 26.04.03.02 and .03-Development Plan submission requirements.)

The Howard County Plumbing Code complies with the Annotated Code of Maryland, Article 56, Section 445 - Water Conserving Fixtures. The Inspections and Enforcement Division of the Department of Inspections, Licenses and Permits conducts plumbing inspections within the County. A separate inspection for fixtures is conducted and approval/disapproval is noted on the inspection record. The inspector's approval signature on the inspection record officially certifies that all fixtures in the residence and their installation comply with the 2009 National Standard

Plumbing Code Illustrated and local amendments incorporated in the Howard County Code.

Howard County inspectors do not approve an inspection if water conservation devices are not installed. If non-water conservation devices are installed, a notice of violation is issued and, if not corrected at the time of re-inspection, a civil citation is issued. Neither a temporary nor final certificate of occupancy is issued to the owner until water conservation fixtures have been installed.

Planned Service Area

The eastern portion of the County has been delineated as the Planned Service Area for public water and sewerage (See Exhibits 9 and 10). This area consists of all properties within the County approved by the Howard County Council to be in the planned service area. Although the 2000 General Plan and associated amendments did not propose an expansion of the Planned Service Area to accommodate future residential or commercial growth, it did provide for an expansion of the Planned Service Area, under limited circumstances, for certain public or institutional uses. Any such expansion for public or institutional uses must meet criteria limiting the parcel size to the minimum necessary for the proposed institutional use and requiring actual construction of the proposed use and connection to the public system by a specific deadline. Institutional expansions of the Planned Service Area boundary are limited to institutional properties adjacent to the existing boundary of the Planned Service Area which continue the linear boundary line of the Planned Service Area without including an intervening privately owned parcel currently not located in the Planned Service Area. Before obtaining public water or sewer service, a property must enter the County's Metropolitan District. Property in the Metropolitan District is subject to fees, assessments and charges required to finance the construction, operation and maintenance of the public water and sewerage system.

Parcels of land designated in the Howard County Master Plan for Water and Sewerage as in the “no planned service area” are not eligible for connection to the public water and / or sewerage system. However, parcels, which the Health Department, Bureau of Environmental Health, under emergency circumstances, has ordered connected, are eligible for connection if the public system is available to the

property. These parcels will not be incorporated into the Metropolitan District after connection, nor brought into the Planned Service Area. They are subject to the fees, assessments, and charges to finance the construction, operation, and maintenance of the public water and sewerage systems to the same extent as parcels in the Metropolitan District. These connections must be in accordance with section 18.101 of the Howard County Code.

Orderly expansion of the public water and sewer system is controlled through the County's Capital Budget and Ten Year Capital Improvement Program, the Metropolitan District entry process, the subdivision plan review process, and the Water and Sewer Capacity Allocation Program. These processes and programs are more fully described in the following section.

In general, undeveloped properties within the Planned Service Area which are not to be serviced by planned capital projects are to be serviced via Developer Agreements. It is difficult to establish when specific parcels will be developed. Changes in economic conditions and other factors occurring after approval of the Master Plan for Water and Sewerage may result in a developer desiring to service a property at a time earlier than is specified by the Master Plan for Water and Sewerage. Similarly, a developer may desire to construct planned facilities in advance of the County capital project construction schedule. If the proposed development represents an orderly extension of the public water or sewer system and is consistent with the County's General Plan and subdivision regulations, the County grants the service priority change so development can occur. Therefore, service area priorities identified in the Master Plan for Water and Sewerage and associated maps are subject to change as development is proposed within the Metropolitan District. These changes are incorporated in semiannual and regular triennial amendments to the Plan as appropriate and are described below.

As noted under the discussion of the comprehensive priority area, the County shall not accept or approve a proposal to change the priority area designation for the provision of public sewerage service to any parcel in the Alpha Ridge Water Service Area unless sewer service is only being provided for the parcel to serve public facilities, or unless the General Plan is amended to designate the priority in this area for urban district land uses. Until one of these conditions is met, parcels in the Alpha

Ridge Water Service Area shall remain in the comprehensive priority category for sewerage service.

Parcels of property in the Planned Service Area (including lots in a subdivision), are assigned water and sewer service priorities as delineated on the service area maps referenced in Chapters 3 and 4 based on the definitions and criteria described below:

-Existing and Under Construction Priority Area

Parcels of land in the existing and under construction service priority area are served by water or sewer lines in operation or under construction (for capital projects a notice to proceed with a contract has been let, for developer projects a developer agreement has been executed), and are expected to be in operation immediately upon completion. Parcels or lots assigned this service priority must be in the County's Metropolitan District, and must meet one of the following three (3) criteria:

1. The parcel is developed, is not likely to be further subdivided, and fronts on an existing water or sewer line to which a house or building connection can be or has been made, or
2. The parcel is not developed, is likely to be developed without further subdivision, and fronts on an existing water or sewer line to which a house or building connection can be made, or
3. The parcel fronts on an existing water or sewer line to which a house or building connection can be made, and
 - a. will likely be developed after a minor subdivision of the parcel, that is, subdivision of the parcel into four or fewer lots not involving construction of a new street, or
 - b. will be developed such that the water demand and wastewater flows generated will not be great enough to warrant separate tracking of the parcel's development status in the Master Plan for Water and Sewerage.

It is assumed in evaluating parcels for inclusion in the existing service priority area that subdivision will occur in conformance with either existing zoning or the 2000 General Plan as amended, whichever provides for higher density development.

-Zero to Five Year Priority Area

In conformance with direction received from the Maryland Department of the Environment by letter dated November 28, 1984, the previous S-2/W-2 Final Planning Area, S-3/W-3 Immediate Priority Area, and S-4/W-4 Three to Five Year Priority Area specified in COMAR 26.03.01.04.G(2) have been incorporated into a single zero to five (0-5) year service priority area. A parcel assigned this service priority must meet both of the following criteria:

1. Development of the parcel within the zero to five year time frame must be consistent with the 2000 Howard County General Plan and Amendments, and related County policy.
2. In addition to the above, the parcel must meet one of the following four (4) criteria:
 - a. The parcel is divided by or fronts on an existing water or sewer line, or one which will be constructed within a five year period as part of an established capital project, which can provide adequate service when development takes place. The parcel and water or sewer line must be located in the same sewer service area or water pressure zone, or
 - b. The parcel will be subdivided and/or developed by a private party who:
 1. Will provide public water or sewer service, and
 2. Has submitted a sketch plan, preliminary plan, final subdivision plan or other adequate evidence for a

development which is planned to occur within five years, which documents an orderly extension of the public water or sewer system within the sewer service area or water pressure zone in which the parcel is located, or

- c. The parcel is located within 1,000 feet of the existing water or sewer system which could be extended to provide adequate water or sewer service within the sewer service area or water pressure zone in which the parcel is located. This criteria is based in part on Department of the Environment criteria governing the construction of routine water main and sewer line extensions for which a State construction permit is not required, or
- d. The parcel is located within 1,000 feet of a portion of the water or sewer system which will be constructed within five years as part of an established capital project in the County's Ten Year Capital Improvement Program and could be further extended to provide adequate water or sewer service within the sewer service area or water pressure zone in which the parcel is located.

Parcels which are not in the County's Metropolitan District but, otherwise, meet the criteria for inclusion in the existing and under construction priority area are assigned to the 0-5 priority area.

As indicated above, one of the conditions for inclusion in the 0-5 year priority area is that adequate water and sewer facilities must be located within the water pressure zone or sewer drainage area in which the parcel is located. Boundaries between adjacent drainage areas and zones are not static and may be altered on a temporary or permanent basis (by valves, force mains, etc.) to provide for the needs of parcels adjacent to or divided by these boundaries. Generally, the desirability of relocating a zone or drainage area boundary will be assessed by the Department of Public Works at the time of submission of a sketch plan or other preliminary document which describes provisions for water and sewer service in detail. The desirability of boundary relocations will be assessed on a case-by-case basis considering such factors as conformance of the proposed project with sound

engineering practice, the existing and future impact on zones or drainage areas being altered, and the need for an orderly extension of existing facilities.

-Six to Ten Year Priority Area

Parcels assigned this service priority must meet the following two (2) criteria:

1. Development of the parcel within the six to ten year time frame must be consistent with the 2000 Howard County General Plan and Amendments.
2. The parcel must be located in a sewer service area or water pressure zone within which the major system components (primarily interceptors and transmission mains) are in place or are planned to be in place within ten years, or

The parcel will be subdivided and developed by a private party who:

- a. Will provide public water and sewer service, and
- b. Has submitted a plan or other adequate evidence for a development which is planned to occur within six to ten years, which documents an orderly extension of the public water or sewer system within the sewer service area and water pressure zone in which the parcel is located.

-Comprehensive Priority Area

The comprehensive priority area is for the parcels located in the Planned Water and Sewerage Service Area which are not assigned one of the above service priorities and are not park or open space land. These parcels are designated for service after a ten-year period. Developed parcels located in service areas which will not have the major system components in place within ten years are assigned this service priority.

The County will not initiate capital projects to extend public water and sewer service to these areas for the purpose of promoting private development. The County Council amended the 1990 General Plan for Howard County by extending the

Planned Service Area to incorporate certain properties in the Marriottsville Area as shown on Map 1 attached to County Council Resolution 145-1993 and the Map attached to Council Bill 73-1996. The properties added to the Planned Service Area are referred to in this chapter as the Alpha Ridge Water Service Area. The express intent of the amendments to the General Plan was to provide public water service to satisfy residents' concerns about potential groundwater contamination. The effect and intent of the Amendment to the General Plan were continued in the 2000 General Plan approved in November 2000. Council bill 18-2006 amended the General Plan to allow for the provision of sewer service within the Alpha Ridge Water Service Area for qualifying parcels under certain conditions. A qualifying parcel is one that is owned either by Howard County Government or the Board of Education of Howard County. The qualifying parcel must adjoin another parcel where sewer service is available. Sewer service to a qualifying parcel may be extended only if sewer service can be extended without making sewer service available to any intervening non-qualifying parcel not owned by the Howard County Government or the Board of Education of Howard County. With the exception of qualifying parcels, the County's intent was also to maintain this service area in the comprehensive priority area for sewer service. The comprehensive priority area designation for sewer service shall remain in place unless the General Plan is amended to designate this area for urban district land uses. Until such amendment is approved, the County shall not accept or approve a proposal from a private party to amend the Sewer Service Area priority designation for a parcel in the Alpha Ridge Water Service Area. The only exceptions allowing for the provision of sewer service in the Alpha Ridge Water Service Area are for parcels on which public facilities are located, or for parcels which the Health Department, Bureau of Environmental Health, orders connected for emergency health reasons. An order for connections by the Health Department can only be implemented if the public sewerage system is available to service the parcel. Availability shall be determined by the Department of Public Works. Any connection made pursuant to Health Department order shall be restricted to the minimum pipe size necessary to correct the health problems for the existing building (s) in use on the parcel at the time of the Health Department order.

-Parks and Open Space

Public park land and designated open space areas within the Planned Service Area are separately identified on the water and sewerage maps. Since these properties will not be subdivided for residential or commercial/industrial development, they are not assigned a service priority. However, it is not intended to prevent the extension of water or sewer lines to these properties in the Planned Service Area, if such extensions will provide for facilities consistent with the designated land use. For example, water and sewer extensions may be necessary to provide for:

1. Restrooms or other sanitary facilities.
2. Lawn/garden irrigation systems.
3. Potable drinking water supply.

It is intended that such extensions may occur at any time if the property is in the Metropolitan District; the water or sewerage system is adequate to provide the required service; and the project represents an orderly extension of the system. Occasionally, open space areas may be used for other public purposes. For example, possession may be given to the Board of Education as a location for a school. Provision of water and sewer service to such properties is considered in accordance with the intent of this Master Plan for Water and Sewerage provided the development meets all other County development criteria.

No Planned Service Area

Parcels in the No Planned Service Area will not be provided with public water or sewerage facilities. Shared Sewage Disposal Facilities and Multi-User Sewerage Systems, to the extent provided in the Howard County Code, may be used in the No Planned Service Area as described below. Generally, properties designated in the General Plan as Rural Conservation (RC) or Rural Residential (RR) are assigned to this service area. The associated population densities and land uses can be accommodated by private individual and small grouped systems. The extent of the

No Planned Service Area may change if County land use plans, in particular, the General Plan, are revised to recommend land uses which require inclusion of affected properties in the Planned Service Area.

Although the 2000 General Plan and amendments did not propose an expansion of the Planned Service Area to accommodate future residential or commercial growth, it did provide for an expansion of the Planned Service Area, under limited circumstances, for certain public or institutional uses. Any such expansion for public or institutional uses must meet criteria limiting the parcel size to the minimum necessary for the proposed institutional use and requiring actual construction of the proposed use and connection to the public system by a specific deadline. Institutional expansions of the Planned Service Area boundary are limited to institutional properties adjacent to the existing boundary of the Planned Service Area which continue the linear boundary line of the Planned Service Area without including an intervening privately owned parcel currently not located in the Planned Service Area.

The County will no longer extend the Planned Service Area for RR and RC zoned parcels in order to address public health concerns; such parcels will still be provided with the needed connection to public water and / or sewerage service, if in the opinion of the Director of Public Works public systems are available, but will not be included in the Metropolitan District. Such connections must be required by the Health Department, Bureau of Environmental Health.

The County has provided a water main extension into the No Planned Service Area to the West Friendship Fire Station site at the intersection of Rt. 99 and Rt. 32. This main is only utilized for fire suppression at the West Friendship Fire Station site. Individual parcels outside of the planned service area and fronting on this water main will not be allowed to connect.

-Shared Sewage Disposal Facility

"Shared Sewage Disposal Facility" means a sewerage system which serves more than one lot of land with public collection sewers, common septic tank and / or advanced pretreatment, and shared subsurface sewage disposal fields.

Undeveloped properties zoned RR and RC within the No Planned Service Area may be serviced by private individual on-site septic systems or shared sewage disposal facilities. Howard County Code Title 18, Subtitle 12, establishes requirements and procedures for shared disposal facilities to serve cluster development permitted on RR and RC zoned land. These systems are proposed and constructed by private developers of residential subdivisions. Shared sewage disposal facilities are designed in accordance with County standards. Shared sewage disposal facilities must be approved by the Department of Public Works, Department of Planning and Zoning, the Health Department, Bureau of Environmental Health, and, at their discretion, the Maryland Department of the Environment prior to construction. Shared facilities which require a State Groundwater Discharge Permit issued by the Maryland Department of the Environment are prohibited under Section 18.1202 of the Howard County Code. Shared facilities generally consist of pumps and controls located on individual parcels which discharge to a common sewer main. The sewer conveys collected sewage to a common pretreatment area consisting of septic tanks and other pretreatment. Treated effluent is discharged to a subsurface soil absorption area. Shared sewage disposal facilities and related easements become County property after construction. Shared facilities operation and maintenance is the responsibility of the Department of Public Works.

Parcels of property in the No Planned Service Area are assigned sewer service priorities only for shared sewage disposal facilities as delineated on the service area maps referenced in Chapter 4 based on the definitions and criteria described below. It is noted that only three service priorities are provided. Given that a developer's intention to provide a shared sewage disposal facility generally becomes known when development plans are submitted for County review, or as a result of presubmission consultation, the "Six to Ten Year" and "Comprehensive" service priorities applicable to the planned service area are not relevant.

-Existing and Under Construction Priority Area

Parcels of land in the existing and under construction service priority area are served by shared sewage disposal facilities in operation, or which are under construction and are expected to be in operation immediately upon completion.

-Zero to Five Year Priority Area

A parcel assigned this service priority will be served by a shared sewage disposal system and must meet both of the following criteria:

1. Development of the parcel within the zero to five year time frame must be consistent with the 2000 Howard County General Plan as amended and related County policy. In addition, the parcel will be subdivided and/or developed by a private party who:
 - a. Will provide shared sewage disposal facilities, and
 - b. Has submitted a sketch plan, preliminary plan, final subdivision plan or other adequate evidence for a development which is planned to occur within five years,

-No Planned Service Priority Area

Prior to the submission of development plans or other notification of a developer's intent to construct a shared sewage disposal facility, it is not possible to determine if a shared facility will be provided to service a subdivided property. For this reason, properties in the No Planned Service Area which are not included in one of the two priority areas described above, are simply designated as "no planned service". The "no planned service" priority assigned to a parcel can be revised if use of a shared sewage disposal facility, in accordance with Title 18, subtitle 12 of the Howard County Code, is proposed in accordance with the criteria described for the "zero to five" year priority area.

Allocation of Water and Sewer Capacity

Howard County has developed and implemented a capacity allocation program to control connections to the public water and sewerage systems in the Planned Service Area. Properties within the Metropolitan District are prioritized as to eligibility for connection in accordance with the requirements of Section 18.122B of the County Code. Regardless of the service area priority assigned to a parcel or

subdivision in the Master Plan for Water and Sewerage, a capacity allocation must be granted under Section 18.122B prior to connection to the water or sewer system.

Extension of the Water or Sewerage System by Capital Projects

Capital Projects in the Planned Service Area are shown in the County's Capital Budget and Ten Year Capital Improvement Program with projected implementation schedules. These projects are also described in Tables 8 and 12 located in Chapters 3 and 4, respectively. Interceptors, transmission mains, pumping stations, and storage facilities are identified on the facilities maps included with this plan.

Private Individual Water and Sewerage Systems

"Individual water supply system" means a single system of piping, pumps, tanks, or other facilities utilizing a source of ground or surface water to supply only a single lot.

"Individual sewerage system" means a single system of sewers and piping, treatment tanks or other facilities serving only a single lot and disposing of sewage or individual wastes of a liquid nature, in whole or in part, on or in the soil of the property, into any waters of this State or by other methods.

"Community sewerage system" means any system, whether publicly or privately owned, serving two or more individual lots, for the collection and disposal of sewage or industrial wastes of a liquid nature, including various devices for the treatment of the sewage and industrial wastes.

"Community water supply system" means a source of water and a distribution system, including treatment and storage facilities, whether publicly or privately owned, serving two or more individual lots.

The installation of public community water and sewerage facilities in the Planned Service Area eliminates the need for private water and sewerage systems in the areas for which public service is or will be provided. However, the

implementation of public water and sewerage facilities occurs over several years, necessitating the installation of individual water or sewerage systems for new development where public facilities are not yet available. Installation of individual systems in the Planned Service Area is subject to the following conditions:

1. Public Community Water or Sewerage System is “adequate and available”

An individual water supply or individual sewerage system may not be installed on any parcel or lot where a public community water or sewer system is adequate and available.

An "adequate" public community water or sewerage system is defined as a system in which unused capacity exists for allocation. Adequacy is determined based on an analysis of hydraulic and treatment capacities versus current, allocated, measured and/or estimated use.

An "available" public community water or sewerage system is defined as a system to which a house or building connection can be made in a cost effective manner without excessive extension of the existing public community system. The Department of Public Works will determine whether or not a connection is cost effective or is an excessive extension. The Department of Public Works and the Maryland Department of the Environment are responsible for determining the adequacy of a public community system. In the context of this section of the Master Plan for Water and Sewerage, a public community water or sewerage system is a County owned water or sewerage system.

2. Public Community Water or Sewerage System will be “adequate and available” within a Two Year Period.

Where a parcel or lot will have an adequate public community system (constructed as part of a capital project) available within a two year period, installation of capped water and sewer lines will be required in accordance with County Subdivision Regulations, Section 16.131. Lines are constructed after execution of an appropriate Developer Agreement with Howard County. The final subdivision plat must include a statement that the subdivision may only

utilize interim individual water and sewerage systems for a maximum period of one (1) year after public water and sewer become available. Capacity will be reserved through the established allocation program for these subdivisions.

3. Public Community Water or Sewerage System will be “adequate and available” within a Five Year Period.

Interim individual water supply and interim individual sewer systems may be permitted to be installed on any parcel or lot which will have an adequate public community system (constructed as part of a capital project) available within a five year period provided that:

- a. Permits for such interim individual systems bear a notice regarding the interim nature of the permit and stating that connection to a future public community system shall be made within one year after the public community system becomes “available”,
 - b. Such interim individual systems are judged by the local Health Department, Bureau of Environmental Health and Department of Public Works to be adequate, safe, and in compliance with pertinent state and local regulations, including minimum lot ownership as set forth in COMAR 26.04.03.03, and
 - c. Such individual systems are located to allow future connections to the public community system in the most economical and convenient manner.
4. Public Community Water or Sewerage System will be “adequate and available” beyond a Five Year Period.

Individual water supply or individual sewer systems, not of an interim nature, shall be permitted to be installed on any parcel or lot which will not have an adequate public community system (constructed as part of a capital project) available within a five-year period. Such installations shall be governed by COMAR 26.04.03.02 and .03 as minimum requirements.

5. Individual Water Supply and Sewer Systems on Lots of Three (3) Acres or More.

Within the Planned Service Area, regardless of when an “adequate” community water and/or sewer system will be available, if the minimum lot size is three (3) acres a developer may utilize permanent on-site water supply and individual sewer systems.

6. Private Multi-User Water and Sewerage Systems

A "multi-user sewerage system" means a single system serving a single lot, whether owned or operated by an individual or group of individuals under private or collective ownership, and serving a group of individuals for the collection and disposal of sewage or industrial wastes of a liquid nature, including various devices, if any, for the treatment of sewage and industrial wastes, having a treatment capacity in excess of 5,000 gallons per day.

A "multi-user water supply system" means a single system of piping, pumps, tanks, or other facilities utilizing a source of ground or surface water to supply a group of individuals on a single lot and having a capacity in excess of 1,500 gallons per day, as defined by COMAR 26.03.01.01

Multi-user sewerage systems which include devices for the treatment of sewage will not be permitted to serve any properties located within the Planned Service Area. In addition, residential multi-user water supply systems will not be permitted within the Planned Service Area. Multi-user Sewerage Systems located outside the Planned Service Area are regulated by the Maryland Department of the Environment and the Health Department, and under certain circumstances and in a limited capacity, as defined in Title 18, Subtitle 12, of the Howard County Code, may be subject to oversight responsibilities by the Department of Public Works.

Private multi-user sewerage pumping systems used to convey sewage to the public sewerage system, which typically consist of privately owned and constructed pumping station, force main and outfall used to provide sewer service to non-residential properties for which gravity service from the public sewerage system is not available, will be permitted if the following conditions are met:

- a. The sewerage pumping station, force main, and property served must be owned, operated and maintained by a single property owner.
- b. Pumped sewer service is allowable only if gravity service is not available in a cost effective manner as determined by the Department of Public Works.
- c. Capacity for the pumped (diverted) sewage flow must be available in the receiving area above the currently projected needs of the receiving area.
- d. The discharge force main must terminate in a manhole located on the property served. The gravity outfall sewer must be able to connect to an existing gravity sewer without the need to acquire additional public rights-of-way. Existing public rights-of-way may be used. However, any construction within a public right-of-way will become a public utility owned and operated by Howard County Department of Public Works. Any such construction must meet County standards and be approved by the County. The length of sewer in a public right-of-way which will not become a permanent part of the public sewerage system when the private pumping station is abandoned shall be minimized. All designs of private multi-user sewerage pumping systems shall take into account odor mitigation at the point of discharge, and protection of existing public gravity sewer mains from hydrogen sulfide deterioration.
- e. The private pumping station must be abandoned when gravity sewer service becomes available to the property. The pumping station must be located such that future gravity service will be easily accessed.

- f. The owner of the pumped system, which is a private system, is required to obtain all relevant permits, including plumbing permits, building permits, etc.

Privately owned pumping stations which serve more than one property are considered as private community systems. These systems are subject to the same criteria as private multi-user sewerage pumping systems as well as the additional requirements below:

- g. The owner of the pumping station must submit to the Maryland Department of the Environment assurances in the form of legal documents that the facility will be maintained and operated so as to provide continuous acceptable sewage disposal service to the properties served.
- h. The pumping station owner shall submit to the Maryland Department of the Environment evidence that a certified Class II System Operator (or a contracted utility service utilizing certified operators) has been hired to operate the pumping station.

Reclaimed Water System

Howard County Bureau of Utilities is taking initial steps toward implementing a County-wide reclaimed water distribution network. Howard County has already constructed a reclaimed water line to a local manufacturer and another project is underway to provide reclaimed water to a quarry in the County. Also a reclaimed water pumping station has been constructed at the Little Patuxent Water Reclamation Plant. These projects were pursued with the expectation that Howard County would eventually implement a county-wide reclaimed water system that would be available not only to businesses, but to homeowners as well.

History

In 1931, under special Maryland legislation, the Elkridge area was created as a special sanitary district, enabling the expansion of the Baltimore City water system to the area in order to relieve shortages of water. In 1943, with other areas of the County experiencing similar problems, the Maryland General Assembly authorized the formation of the Howard County Metropolitan Commission, which would have the authority to create sanitary districts. Each district was governed by the Commission which was responsible for construction, maintenance and operation of water, sewerage and drainage facilities.

In 1948, the Metropolitan Commission created the Elkridge Sub-District which included the old sanitary district. Five years later the Patuxent Sub-District was formed on petition from residents of that area. Agreement with the Washington Suburban Sanitary Commission provided the water supply to the Patuxent Sub-District. The Commission extended the Patuxent Sub-District to include the Savage area in 1955. With this extension the Commission purchased the existing local water and sewerage facilities previously constructed by the Savage Manufacturing Company. A year later the Commission took over the maintenance of the water mains in the Elkridge Sub-District previously maintained by Baltimore City. During 1957 the Commission created the Ellicott City Sub-District and obtained water from Baltimore City to serve that area.

With the increase in residential development partially due to an adequate water supply, the Commission recognized the growing problems of sewage disposal and authorized the preparation of a comprehensive master plan report for the collection and disposal of sewage. As a result of this report and subsequent supplementary financial analyses, the Commission proceeded to develop plans and construct sewerage facilities in those areas over which it had jurisdiction. In 1964 the Commission prepared and adopted its first 5-Year Capital Improvements and Planning Objectives Program.

The Maryland General Assembly passed an act in 1965 under which the existing five Howard County Sub-Districts were combined into one sanitary district called the

Metropolitan District. This single sanitary district greatly simplified the Commission's financial and administrative responsibilities.

In 1966 the Commission presented its second five-year capital improvement program and its third in 1968. These Five Year Program reports provided primary guidance in the planning and development of water and sewer services for the County.

Organization

When Howard County established the Charter form of government in 1969, the Metropolitan Commission was abolished and all administrative duties were transferred to the Executive Branch of government with specific responsibility assigned to the Department of Public Works. The Bureau of Engineering is charged with the design of water and sewerage facilities and with overseeing the construction and inspection of water and sewer projects. Operation and maintenance of water distribution, wastewater collection, and wastewater treatment facilities is the responsibility of the Bureau of Utilities. The Bureau of Utilities is also responsible for water and sewage system planning, including preparation of this Master Plan. Organizational charts are shown in Figures 2, and 2A.

Citizen review is provided through several Boards. The Public Works Board, which is composed of five members appointed by the County Executive and approved by the County Council, makes recommendations to the Executive and to the County Council on planning and on policy matters under the jurisdiction of the Department of Public Works. The Planning Board, which is also composed of five members appointed by the County Executive and approved by the County Council, makes recommendations to the Executive and to the County Council on planning and on policy matters under the jurisdiction of the Department of Planning and Zoning. The Public Works Board and Planning Board review regular triennial amendments to the Master Plan for Water and Sewerage and make comments to the County Executive and County Council.

The legislative duties of the Metropolitan Commission were transferred to the County Council. The County Council has the following responsibilities:

1. Acts on legislative incorporations of properties requesting to be included into the Metropolitan District.
2. Annually reviews and approves water and sewerage system capital improvements as part of the Capital Budget.
3. Annually reviews and approves water and sewer rates, fees, and assessments through the budgetary process.
4. Approves regular triennial and semi-annual Master Plan amendments.

During the Fall of each year, the Department of Public Works solicits public input to assist with future planning for the extension of water and sewer facilities. This public input, in addition to other public requests received during the year, and data developed by the County Health Department, Bureau of Environmental Health and the Department of Public Works, is taken into consideration before water and sewer projects are proposed for inclusion in the Annual Capital Budget and the Ten Year Capital Improvement Program and which are in turn included in the Master Plan.

Master Plan Review Process - Triennial Amendments

State regulations require the Master Plan for Water and Sewerage to be reviewed and amended at least once every three years. The review and approval process utilized by the County is outlined below:

1. The Plan is reviewed and a preliminary draft amendment comprising all proposed revisions is developed by the Department of Public Works, Bureau of Utilities. The preliminary draft amendment is circulated to each County agency affected by its contents, including the Department of Planning and Zoning, Health Department, Bureau of Environmental Health, and other Bureaus within the Department of Public Works. The draft is also submitted to the Maryland Department of the Environment, Department of Natural Resources, and Department of State Planning for preliminary review. After revision based on comments received, a final

draft is submitted to the Planning Board and Public Works Board for review.

2. Public meetings, preceded by printing of a public notice, are held with both the Planning Board and the Public Works Board. The Boards' recommendations are incorporated into Department of Public Works testimony to the County Council.
3. The final draft is submitted to the County Council for consideration during an appropriate legislative session.
4. A public hearing, preceded by two printings of a public notice, is held by the County Council after which further revisions may be made. The Plan amendment is then formally approved by the County Council.
5. The locally approved amendment is submitted to the Maryland Department of the Environment for approval.
6. Following notification of State approval, the Plan amendment is reproduced and distributed in final form.

Master Plan Review Process - Semiannual Amendments

Semiannual Amendments to the Master Plan are developed more frequently than triennial amendments. Several types of revisions, as described on Page 1-1, are usually incorporated into the Master Plan by Semiannual Amendment. The review and approval process utilized by the County is outlined below:

1. The Plan is reviewed and the preliminary draft amendment comprising all proposed revisions is developed by the Department of Public Works, Bureau of Utilities in cooperation with the Bureau of Engineering and Department of Planning and Zoning. The preliminary draft amendment is circulated to each County agency affected by its contents, including the Department of Planning and Zoning, County Health Department, Bureau of Environmental Health, and other Bureaus within the Department of Public

Works. Comments received are considered in the preparation of a final draft.

2. The final draft is submitted to the County Council for consideration during an appropriate legislative session.
3. A public hearing, preceded by two printings of a public notice, is held by the County Council after which further revisions may be made. The Plan amendment is then formally approved by the County Council.
4. The locally approved amendment is submitted to the State Department of the Environment.
5. Following notification of State approval, the Plan amendment is reproduced and distributed in final form.

Growth Management

Development in the County, both outside and within the water and sewer service area, must be in accordance with the approved General Plan and Comprehensive Zoning Plan. Changes in zoning for a given property must be approved by the Zoning Board which is comprised of the members of the County Council. When reviewing petitions filed by property owners for zoning changes, the Zoning Board considers the comments of County departments and agencies. The Department of Public Works provides information on the “availability and adequacy” of public water and sewerage facilities. The Board rules on zoning petitions considering, in addition to other information, the water and sewer data provided by the Department. To insure that growth occurs as specified by approved Plans, an extensive plan review and permit system has been established. Several elements of this system are designed to control expansion and ensure orderly extension of public water and sewer facilities. These elements are described in the remainder of this chapter.

The maintenance of water quality within the County’s existing watersheds is given a high priority in the management of growth and development. As certain Tier II waterways have been identified as being within the Planned Water and Sewer

Service Area (PSA), intense watershed planning is necessary to insure continued protection of such high quality waters, and those waterways identified as Tier II by the Maryland Department of the Environment are given special consideration as outlined in the 2010 Water Resources Element (WRE), which is included in appendices of the Plan. Particular attention should be paid to the section on “Water Quality in Local Streams” beginning on Page 28 of the WRE. In addition, the County’s General Plan 2030, which is currently in preparation, addresses growth management within these areas.

Metropolitan District Entry Procedure

To establish eligibility for water and sewerage service, properties must gain entry into the Metropolitan District unless the Health Department, Bureau of Environmental Health, has ordered connection due to emergency circumstances. The Metropolitan District has been established as a special assessment district to finance water and sewerage services. Public water and sewerage service is restricted by the Howard County Code to properties in the District which pay an annual benefit assessment to fund construction of system improvements and extensions (see sections on Financing Water Improvements and Financing Sewerage Improvements, Chapters 3 and 4). Once a property is accepted into the District, extension of the public water and sewerage systems to provide service is controlled through the subdivision review and permit process, or the water and sewer Capital Improvement Program, and through the capacity allocation program.

The procedures of incorporating a property into the Metropolitan District are established by the Howard County Code (Subtitle 1. Public Utilities, Sec. 18.101. Metropolitan District; Creation; Incorporation of Additional Property. A property located in the Planned Service Area under the definition by this Plan is eligible for entering the Metropolitan District in one of three ways. They are outlined as follows:

1. Administrative Incorporation,
2. Legislative Incorporation, or
3. Emergency Incorporation.

Entry of the property into the Metropolitan District must be accomplished before service can be provided either by a capital project or private developer.

Subdivision Plan Review Process

The subdivision review and approval process, outlined below, is graphically illustrated in Figure 2B.

Property owners may develop land in the County in accordance with the General Plan as adopted by the County Council, which is the basis for the Zoning Map and Zoning Regulations as adopted by the Zoning Board. The subdivision and development of land must be in accordance with Subdivision and Land Development Regulations which are adopted and periodically amended by the County Council. The Department of Planning and Zoning administers the Subdivision and Land Development Regulations with the assistance of County and State agencies, including the Department of Public Works, which provides comments on submitted plans. In cases where strict adherence to the Subdivision Regulations imposes extraordinary hardship or practical difficulty, a land owner or developer may petition the Department of Planning and Zoning for a waiver to relax the minimum requirements. However, the intent of the Regulations must be maintained. The review stages for proposed subdivisions and development include the submission of a sketch plan, a preliminary plan or a preliminary equivalent sketch plan which is a combination sketch and preliminary plan, a final subdivision plan and final plat, and, under certain circumstances, a site development plan, each of which is described below.

-Sketch Plan

The primary purpose of the sketch plan is to inform the County of a developer's intent to develop property. The plan must show the proposed development density, road network, lot sizes and other pertinent factors in a non-detailed format. Copies of the sketch plan are circulated to the reviewing agencies. At this stage, the developer indicates a desire to either connect to the public water and/or sewer system, to construct on-site facilities, or shared sewage disposal facilities (in accordance with Title 18, Subtitle 12 of the Howard County Code). The Department of Planning and

Zoning, Development Engineering Division, conducts a preliminary review to determine the status of public water and sewer service for the proposed development. Factors considered include Metropolitan District status, hydraulic capacity, existing system alignment, and status of future capital projects to serve the area. Proposed development for which adequate water/sewer facilities are available will normally be required by the Department of Public Works to connect to the public system(s).

Where adequate capacity is not available or where the existing public system alignment makes connection infeasible, individual or multi-user systems may be acceptable. These systems are subject to approval by the County Health Department, Bureau of Environmental Health, in conformance with COMAR 26.04.03.02 and .03. Criteria and requirements for the use of these systems were detailed previously in the Private Individual Water and Sewerage Systems section of this chapter.

For properties which are scheduled for public service within 0 to 2 years, the County Code, Section 16.131, requires that the developer install capped water and sewer lines to serve the property or subdivision after public service becomes available. Prior to the availability of public service, the proposed development may be constructed with private systems if approved by the County Health Department, Bureau of Environmental Health. If the Bureau of Environmental Health approval cannot be obtained, development must be delayed until public water and/or sewer can be provided. As an alternative, the developer may be allowed to enter into a Developer Agreement with the County and fund extension of the existing public system to the property.

A Developer Agreement would only be executed by the County if adequate public system capacity is available at the time the development is proposed, and the construction represents an orderly extension of existing facilities.

For properties not scheduled for service by a Capital Project within two years, sketch plans are reviewed by the Development Engineering Division to determine the feasibility of extending the public system by means of a Developer Agreement. A Developer Agreement would be acceptable if adequate capacity is available at the time development is proposed and an orderly system extension would result. In lieu of a public system extension, private systems may be installed subject to County

Health Department, Bureau of Environmental Health approval as previously discussed. In cases where a Capital Project will be constructed to serve the proposed development after two years but within five years, connection to the public system would be required within one year after the system is available. Where a Capital Project will not be constructed within five years, a private system may be considered permanent unless failures make connection to an adequate public system necessary.

For RC and RR zoned properties within the No Planned Service Area for which shared sewage disposal facilities are proposed, the plan must delineate existing and proposed individual wells, individual septic systems, and the proposed shared sewage disposal facilities.

After meeting with the developer and reviewing all recommendations, the Department of Planning and Zoning must correspond with a developer within sixty (60) days of application, indicating approval, approval with modifications, or denial of the sketch plan.

-Preliminary Plan

The purpose of the preliminary plan is to present a plan showing detailed data based on the approved sketch plan, which will enable the County to determine whether the proposed layout is satisfactory, and fulfills the detailed requirements of applicable regulations. The preliminary plan, sealed and signed by a registered engineer or other person qualified by law and licensed in Maryland, is submitted to the Department of Planning and Zoning. As with the sketch plan, distribution is made to the reviewing agencies. These plans include proposed alignment and sizing of public water and sewer systems, when on-site systems are not being installed, or where capped systems are required. In cases where shared sewage disposal facilities are proposed for cluster subdivisions, the shared facilities, the results of soil percolation tests and the locations of water wells are to be indicated on the plans. Review by the Department of Public Works is conducted to insure that the proposed utility design meets established County standards.

Within sixty (60) days after formal plan submittal, the Department of Planning and Zoning must take action on the plan and communicate same to the developer.

-Preliminary Equivalent Sketch Plan

The purpose of the preliminary equivalent sketch plan is to provide an alternate plan process, which includes all the information normally, required with both the sketch and preliminary plan submission on one plan. The preliminary plan stage may be omitted if a developer selects the preliminary equivalent sketch plan process in lieu of the separate sketch and preliminary plan submission.

The plan review process and capacity allocation procedures for the preliminary equivalent sketch plan are similar to those described herein for the sketch and preliminary plans. The preliminary equivalent sketch plan is sealed and signed by a registered engineer or other person qualified by law and licensed in the State of Maryland.

Within sixty (60) days after formal plan submittal, the Department of Planning and Zoning must take action on the plan and communicate same to the developer. Upon approval of the preliminary equivalent sketch plan, the developer would proceed directly to the final plan submission process.

-Final Subdivision Plan and Final Plat

The final subdivision plan must be submitted to the Department of Planning and Zoning within the required adequate public facilities milestone date of 4, 6, or 9 months as specified in Section 16.144 of the Subdivision and Land Development Regulations. The submission includes copies of a final plat which will become the official record of the subdivision of land within a development and construction drawings which are distributed for comments. The Department of Public Works reviews the construction drawings to insure that design and construction standards are met.

All subdivision plats must also receive County Health Department, Bureau of Environmental Health approval in accordance with County Subdivision Regulations, Section 16.144 of the County Code.

Where private systems or shared sewage disposal facilities are to be installed, final plans must be in conformance with State and County Health Department regulations and a shared sewage disposal facility plan shall be submitted to receive Department of Public Works, Bureau of Utilities approval in accordance with Section 18 of the Howard County Code. Within sixty (60) days after final plan approval by the Department of Planning and Zoning, the developer must submit the original construction drawings (roads, storm drainage, water, and sewer) for signatures after which the final plat is approved. The final plat must delineate all access and maintenance easements for shared sewage disposal facilities. A temporary allocation of water and/or sewer capacity is granted at the time of final plat approval for development in the planned service area. This allocation is held for one hundred eighty (180) days during which time the developer must execute a Developer Agreement for water, sewer and/or shared sewage disposal facilities and for roads and storm drains. If the Developer Agreement for water and/or sewer is not executed within this time period, then the allocation becomes void unless an extension is granted.

Upon execution of the Developer Agreement, the allocation is formally granted to the property in accordance with the provisions of the agreement. A prerequisite to the execution a Developer Agreement is the posting of a performance bond with the County by the developer to ensure the facilities construction. After execution of appropriate Developer Agreements, and within 180 days after final plan approval, the final plat is recorded in the Land Records of Howard County which allows the legal sale of each lot. In cases where a property owner wished to create four (4) or fewer lots, known as a minor subdivision, only a final plat is required in the subdivision process. In this case, review of the final plat is conducted to determine the adequacy of provisions for water and sewer service based on the criteria previously described for sketch plans.

-Site Development Plan

The site development plan is a detailed design drawing required for all commercial, institutional, and industrial development and for the following types of residential lots:

1. Single family detached lots
2. Single family attached lots
3. Multi family lots
4. Mobile home lots

In addition, all portions of the County zoned for "New Town" development require submission of a site development plan regardless of development type.

The site development plan may be submitted simultaneously with a final plat. The site development plan review and approval process is illustrated in Figure 2C. The Department of Planning and Zoning distributes this plan for comment by the reviewing agencies. On the site development plan, existing and proposed building locations, structures, walkways, vegetative cover, existing and proposed grades, landscaping, and sediment and erosion control measures are identified. After plan approval, a building permit may be processed. Issuance of a building permit is contingent on execution of a Department of Public Works Developer Agreement where required.

Capacity Allocation Program

Howard County has developed and implemented a capacity allocation program to control connections to the public water and sewer systems in the Planned Service Area. Properties within the Metropolitan District are prioritized as to eligibility for connection in accordance with the requirements of Section 18.122B, "Allocation of Water and Sewer Capacity" of the County Code.

Property in the Metropolitan District for which a subdivision has been recorded or which is undergoing the subdivision process is subject to the allocation program. Six (6) priority classifications have been established and each property is assigned one of these classifications. Capacity is reserved to satisfy the demands for priority no. 1 properties first, for priority no. 2 properties second, etc. until all available capacity is allocated. If insufficient capacity is available to satisfy all demands for priorities 1 through 6, then properties with lower assigned priorities cannot be given a capacity allocation. As a result, unless these properties are later assigned a higher priority in

accordance with Section 18.122B, or additional capacity becomes available, connection to the public system cannot be made.

The assignment of priorities is a dynamic process. Priorities for properties undergoing subdivision are revised as certain steps in the subdivision process are reached. This process is further described in the following priority descriptions:

Priority No. 1, Buildings Under Construction - Buildings under construction which will be connected to the utility have the highest allocation priority.

For properties not requiring subdivision approval, a capacity allocation is assigned when a building permit is issued. If building footings are not installed within six months, or the building permit is revoked, the allocation is forfeited. A six-month extension of the footings installation deadline may be granted at the discretion of the Director of the Department of Inspections, Licenses, and Permits. If the allocation is forfeited, the property is assigned to priority category no. 5 until such time as a building permit may be reissued.

For a property located in an active subdivision for which a building permit has been issued, the allocation is a portion of that assigned to the subdivision at the time of execution of a Developer Agreement. This allocation is assigned for the term of the Developer Agreement and is forfeited when the Agreement expires. The term of the agreement may not exceed three years for commercial and single-family detached residential development. For all residential development except single-family detached, the term of the agreement may be up to four years. A request for a one-year extension of the Developer Agreement may be granted by the County at the discretion of the Director of the Department of Public Works. Portions of a subdivision remaining undeveloped upon expiration of the Agreement are assigned to priority category no. 5.

Priority No. 2, Buildings Required to Connect - Buildings in this category are existing structures which have been ordered to connect to public water or sewer by the County Health Department, Bureau of Environmental Health.

Priority No. 3, Buildable Lots in Active Subdivisions - Lots in subdivisions for which Developer Agreements have been executed and for which Building Permits have not been issued are assigned to this category. Once a building permit is issued for a property within an active subdivision, that property is assigned to priority category no. 1.

Priority No. 4, Properties Dependent upon Capital Project Completion - Developed properties presently utilizing private individual water supply or wastewater systems which can or must connect to the public system upon completion of a Capital Project are assigned to this category. The capital projects which will front these properties must be under construction, have grant funds approved, or be certified by the Director of the Department of Public Works as meeting County legislative requirements.

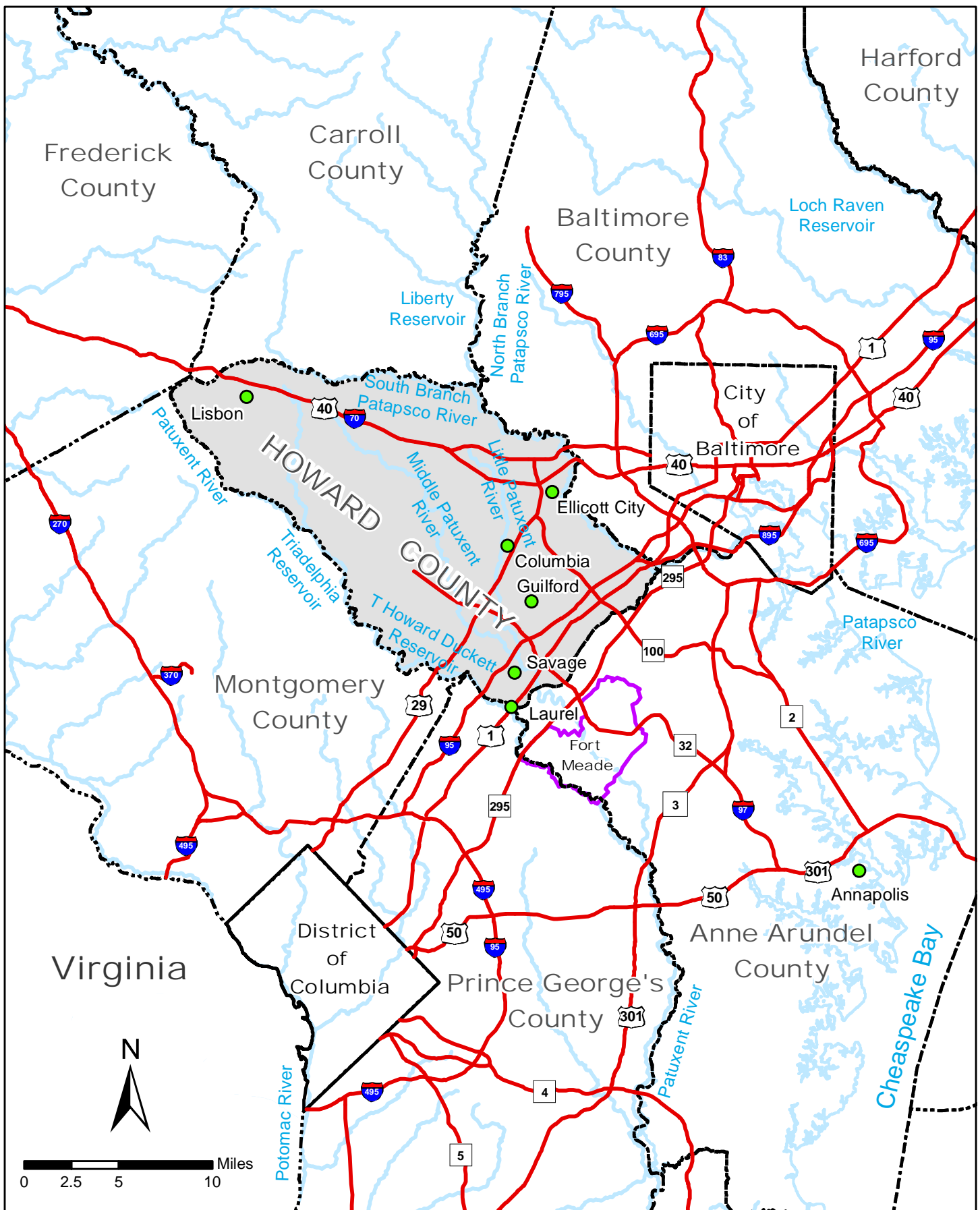
Priority No. 5, Other Buildable Lots - Legal buildable lots located within older inactive subdivisions and buildable lots in subdivisions for which Developer Agreements have expired are assigned to this category. On an annual basis the number of former inactive properties for which building permits will be requested is estimated. Capacity, when available, is assigned to this category to satisfy the anticipated demand. Once a building permit is issued, an allocation is assigned, and the property is moved to priority category no. 1. A building permit for a structure requiring connection to the public water or sewer system will not be issued if the property does not front an existing water or sewer line.

Priority No. 6, Proposed Subdivisions - This category contains all properties which have reached the final subdivision plat approval stage of the subdivision review process and require connection to the public water and sewer system. At this point, the subdivision is assigned a tentative water and/or sewer system allocation if capacity is available. Within 180 days from the date of approval of the final subdivision plat, the developer must enter into a Developer Agreement with the County to guarantee construction of required utilities. If this Agreement is not executed within 180 days, the tentative allocation is forfeited and the final plat approval is revoked. If the Agreement is executed, the subdivision allocation is assigned for the duration of the Agreement and the property is assigned to priority category no. 3.

The size of a capacity allocation assigned to a given property is determined based on the guidelines given in part (C)(7)(d) of Section 18.122B of the County Code.

CHAPTER 1

TABLES AND FIGURES



Howard County and Environs

FIGURE 1

HOWARD COUNTY
WATER AND SEWER FACILITIES MANAGEMENT

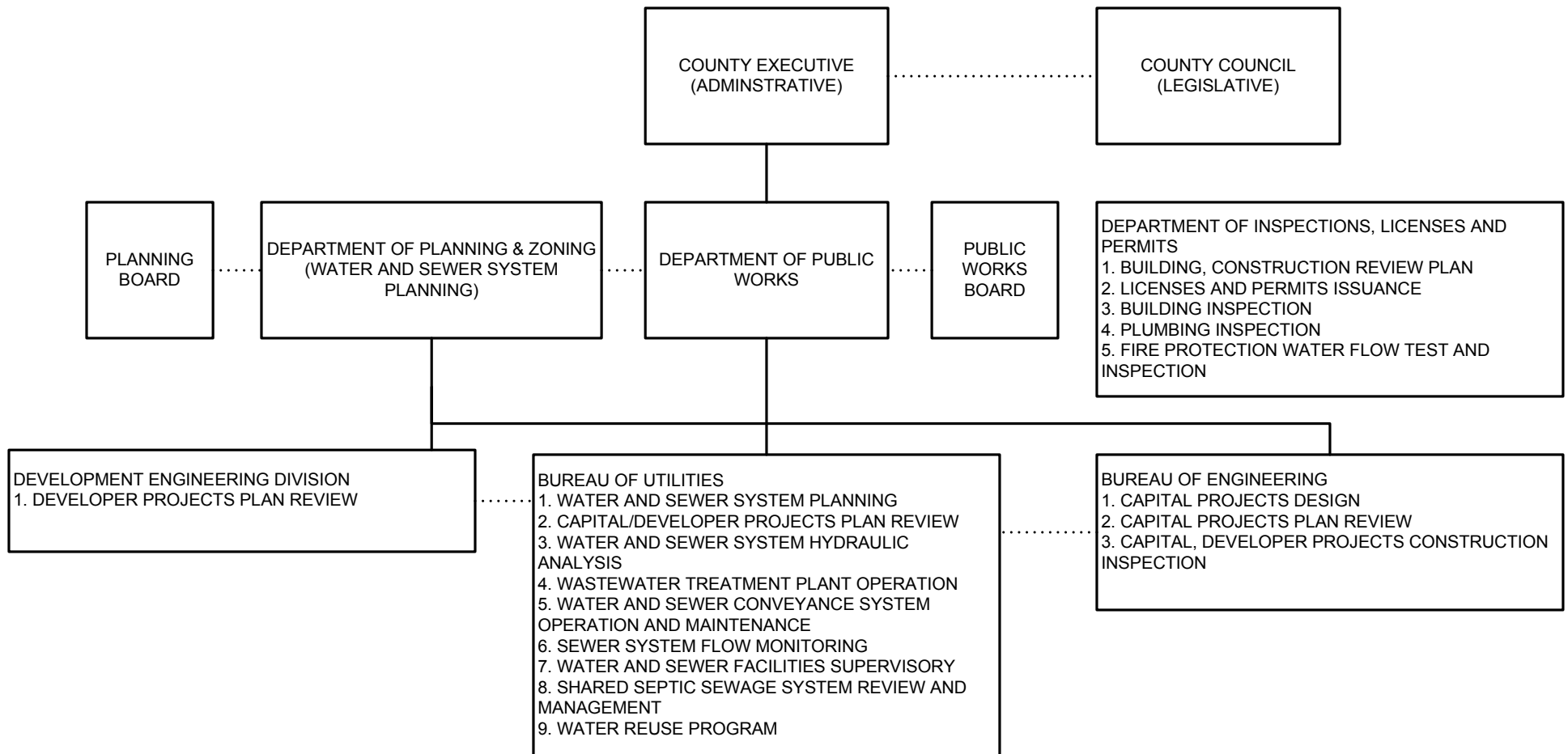


FIGURE 2
REVISED OCTOBER 2011

WATER AND SEWER PLANNING AND GRANTS ADMINISTRATION

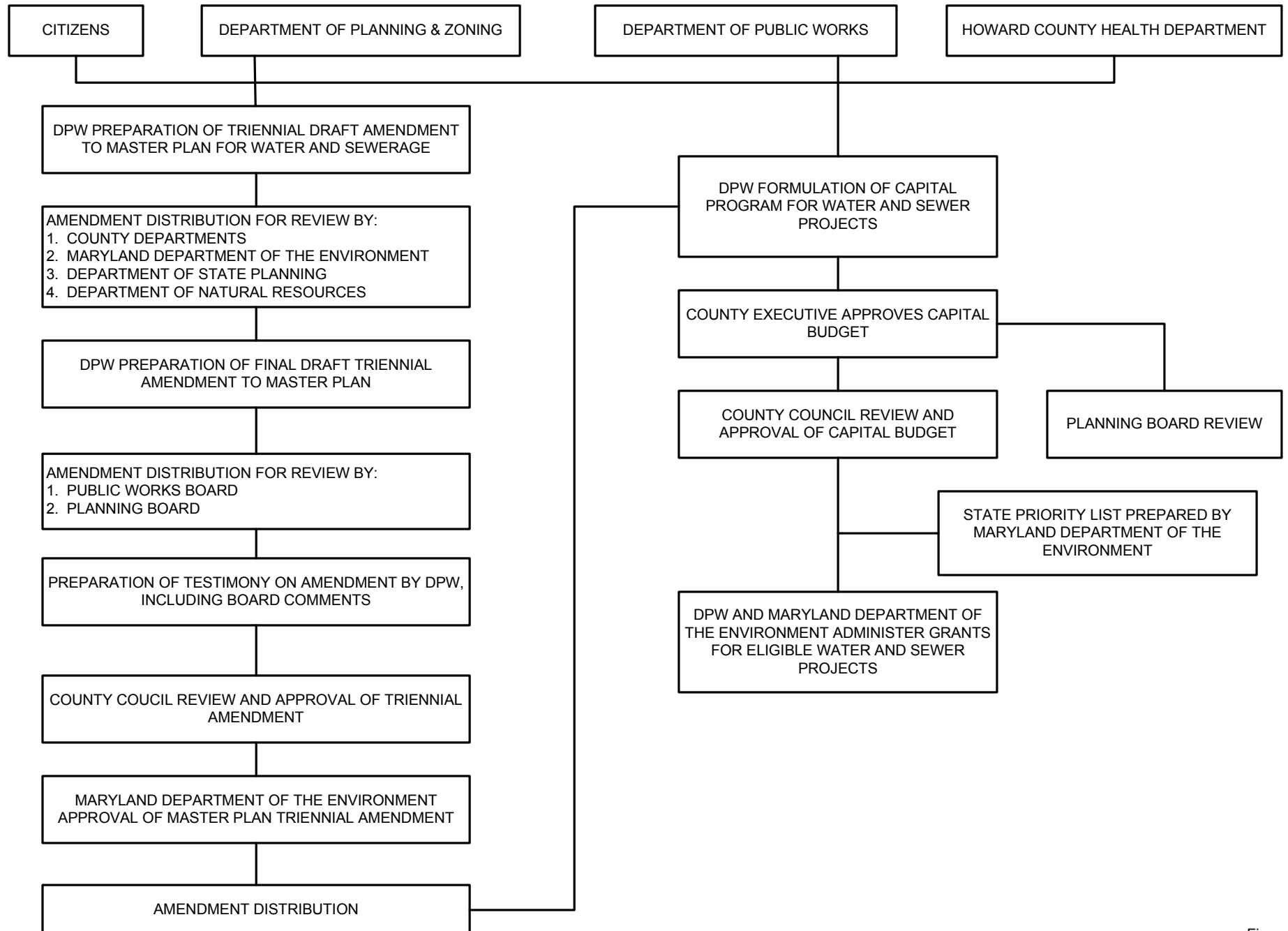
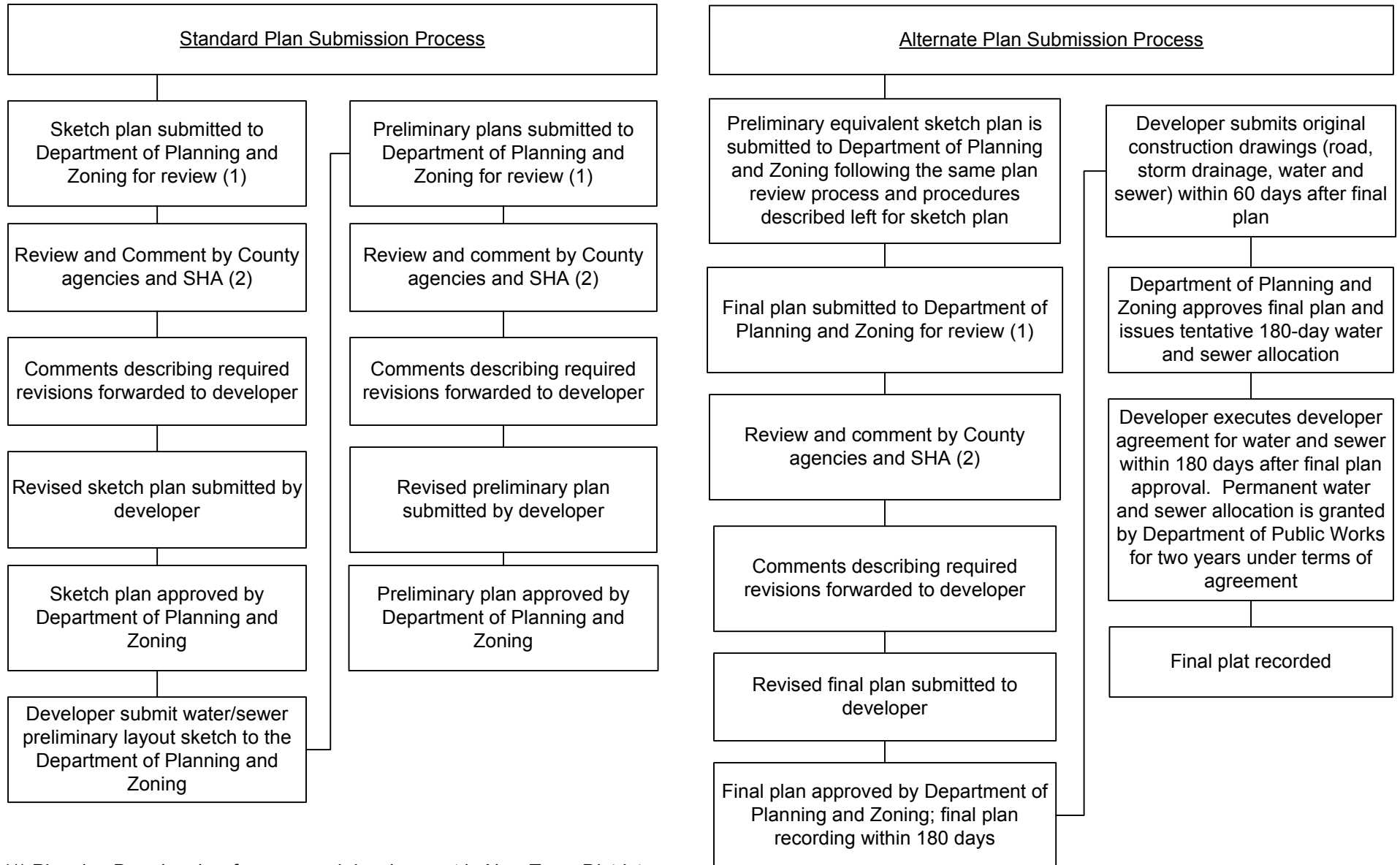


Figure 2A
Revised October 2011

SUBDIVISION PLAN REVIEW AND CAPACITY ALLOCATION PROCEDURE

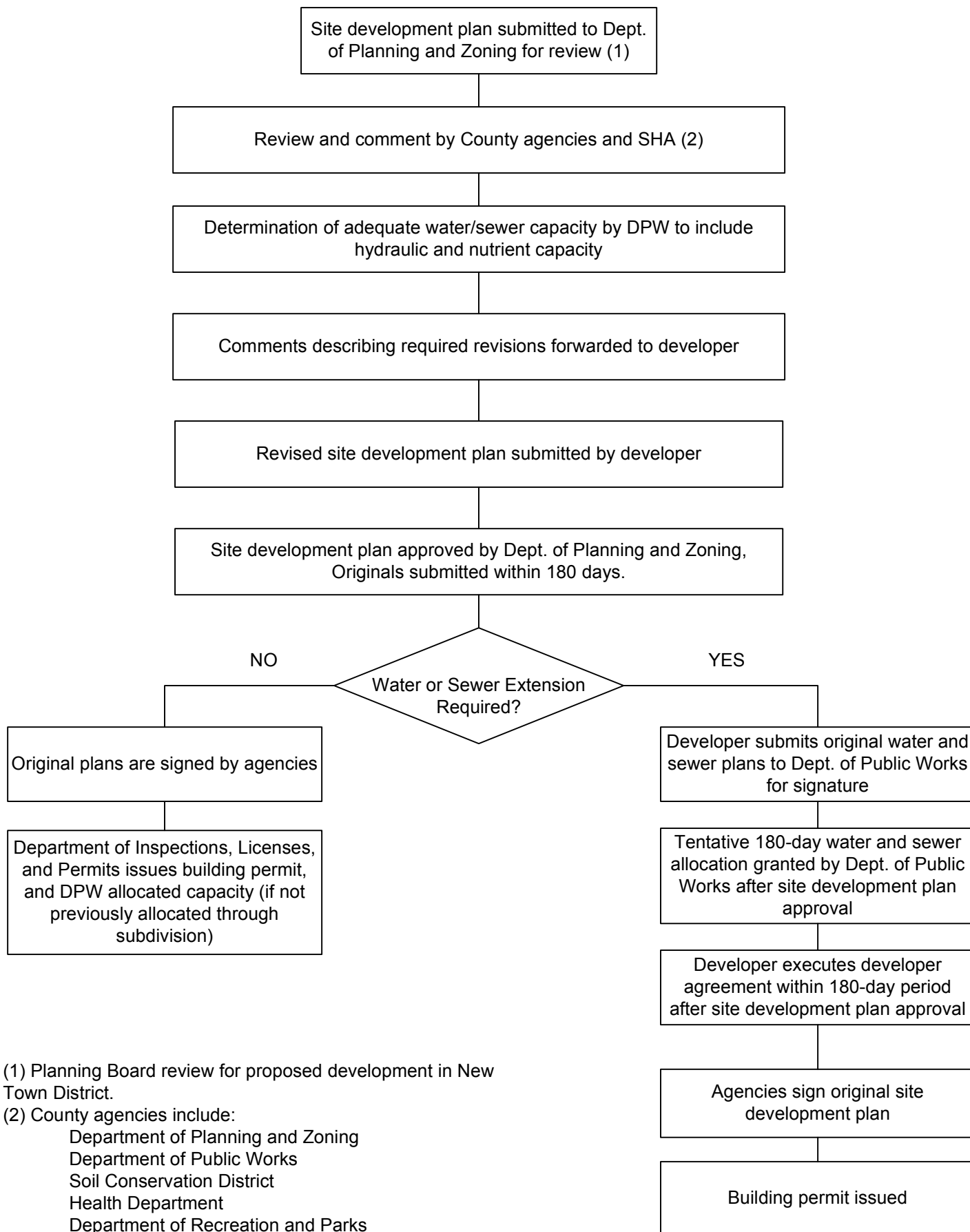


(1) Planning Board review for proposed development in New Town District.

(2) County agencies include:

Department of Planning and Zoning	Department of Recreation and Parks
Department of Public Works	Department of Education
Soil Conservation District	Department of Inspections, Licenses, and Permits
Health Department	
Department of Fire and Rescue Services	

SITE DEVELOPMENT PLAN REVIEW PROCESS AND CAPACITY ALLOCATION PROCEDURE



(1) Planning Board review for proposed development in New Town District.

(2) County agencies include:

- Department of Planning and Zoning
- Department of Public Works
- Soil Conservation District
- Health Department
- Department of Recreation and Parks
- Department of Education
- Department of Inspections, Licenses, and Permits
- Department of Fire and Rescue Services

Figure 2C
Revised October 2011

CHAPTER 2

HOWARD COUNTY PROFILE AND GENERAL DATA

General

Howard County, an area of about 251 square miles, is situated in the central part of Maryland. As shown in Figure 1(Chapter 1), it is bounded by Baltimore, Anne Arundel, Prince George's, Montgomery, Frederick and Carroll Counties. A mix of rural and suburban areas, Howard County lies between the two merging metropolitan areas of Baltimore and Washington, D.C. The County has realized a direct product of this merging of Baltimore and Washington in the town of Columbia and surrounding residential areas along Route 29 and in the industrial development along the I-95 and Route 1 corridors.

Natural Resources

Howard County lies primarily in the Piedmont Plateau with a small portion along the southeastern border in the Atlantic Coastal Plain. The gently rolling terrain and soil characteristics throughout the middle and western parts of the County provide suitable areas for agricultural uses. Ground elevation varies from a low point of 20 feet in the east to as high as 875 feet in the west. A topographic map of Howard County is included in this Plan as Exhibit 11.

Howard County is classified into eight primary soil associations. Figure 3 is a generalized soil map of the County that illustrates the location and extent of these soil associations. A soil association is an area that has a distinctive pattern of soils with similar characteristics. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern. An evaluation of soil characteristics

shows that about 85 percent of Howard County consists of well drained and excessively drained soils. About 10 percent of the County has somewhat poorly drained soils and only 5 percent has poorly drained soils. Approximately 65 percent of the soils are well suited for cultivation. Fifteen percent of the land can support occasional cultivation and 19 percent is unsuitable for cultivation but can be used for trees and some forage crops. Erosion is a potential problem when the soils are cultivated. At least 87 percent of the land suitable for cultivation requires erosion control to lessen non-point source pollution.

The occurrence of groundwater in Howard County is largely dependent on the character, extent and structure of the rock formations. Most of the County is underlain by hard unweathered crystalline rock of low porosity. Therefore, the amount of water which can be stored underground is relatively low and groundwater yields are variable. During dry periods, the water table may drop causing yields from wells and springs to decrease. Most groundwater derived from wells occurs predominantly under confined conditions in the shallow or more permeable part of the crystalline rocks. In general, the water quality of the groundwater withdrawn is acceptable for potable use. It is acidic, soft, and may contain significant levels of iron. Figure 4 provides a generalized view of County geology. Further information on groundwater supplies is presented in Chapter 3 - Water Facilities.

The major watersheds in Howard County are the Patapsco, Patuxent, Middle Patuxent, and Little Patuxent Rivers. Figure 5 shows the major surface water patterns in the County. Triadelphia Reservoir and T. Howard Duckett Reservoir on the Patuxent River have a combined storage volume of 12.5 billion gallons and are used as a source of water supply by the Washington Suburban Sanitary Commission. Smaller reservoirs for recreational purposes have been constructed in Columbia. The flow in the Patapsco River along the northern boundary of the County is regulated by Liberty Reservoir in Baltimore County and to a small degree by Piney Run Reservoir in Carroll County.

All surface waters in Howard County are classified by the Maryland Department of the Environment according to certain standards. This classification is

based upon the Code of Maryland Regulations; COMAR 26.08.01, "Water Quality and Water Pollution Control." Standards are established for bacteriological (fecal coliform) populations, dissolved oxygen, temperature, pH and turbidity. These standards also include the prohibition of chlorine discharge to Class III Waters, "Natural Trout Waters." Waters within the County are classified as indicated in Figure 6.

Population

Howard County's total population in 2009 was 276,770. The Howard County Department of Planning and Zoning has projected that in the year 2035 the total population will be approximately 331,000. The population growth projected for Howard County is the result of two major factors - (a) its strategic location near the center of the expanding Baltimore-Washington region; and (b) by virtue of the fact that the major transportation corridor connecting the two metropolitan areas has shifted from Anne Arundel County to Howard County via Interstate 95 and the dualization and interchange improvements of U.S. Route 29. Figure 7 presents the population growth for Howard County from 1960 projected to 2035. Table 1 presents household population projections by water zone for the planning period 2010 to 2035. Table 1A presents the non-residential acreage, by water zone, for the planning period. Similarly, Tables 1B and 1C present the household populations and non-residential acreages by sewer shed for the planning period.

Increasing urbanization is planned for the eastern portion of the County. Most of the population growth will be absorbed in Columbia and adjacent areas concentrating residential development generally along the Route 29 and Route 40 corridors. Figures 8-10 show the existing and expected population densities by statistical area for the years 2010, 2020, and 2030 respectively.

Figure 12A shows the existing and proposed major public institutions (such as schools, hospitals, correction facilities, and government complexes) in the County. Table 2A provides a summary of the approximate populations of these facilities.

Land Use

Howard County as it exists today is a diversified residential, agricultural, and industrial community. High and medium density residential development is centered in Columbia and in areas along U.S. Route 29 and U.S. Route 40. Industrial development is located along the Interstate 95 and U.S. Route 1 corridors in the eastern portion of the County and in several planned industrial parks located in Columbia. Agricultural and low-density rural residential areas of the County lie to the west of the planned water and sewerage service area. The existing land use pattern is given in Figure 11. Shown in Figure 12 is the County's present zoning classification. Table 2 summarizes the present zoning and the existing and projected land use of Howard County.

The General Plan for Howard County adopted in 2000 (with subsequent amendments) is a policy guide for general land use and development practices. One policy of the plan is to guide land development to those locations where the programmed capacity of public utilities and community facilities are designed to accommodate the expected levels of development. The General Plan Map for Howard County is included as Exhibit 12.

CHAPTER 2

TABLES AND FIGURES

TABLE 1**CUMULATIVE HOUSEHOLD POPULATION PUBLIC WATER SERVICE****2010 Totals**

Water Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Total
NPS	39,245	0	9	7	29	79	0	
350_Zone	509	70	94	0	0	0	0	
400_Zone	15,942	11,312	5,563	1,611	26	28	0	
550_II_Zone	54,207	26,048	17,677	1,657	7	598	1,157	
550_I_Zone	15,833	4,481	6,842	0	0	129	732	
630_East_Zone	15,571	4,231	4,621	0	0	73	0	
630_South_Zone	27	0	0	0	0	0	0	
630_West_Zone	33,206	7,634	6,788	0	87	262	189	
730_Zone	1,562	1,043	335	0	0	150	302	
TOTAL IN PSA	136,857	54,819	41,920	3,268	120	1,240	2,380	240,604
TOTAL IN COUNTY	176,102	54,819	41,929	3,275	149	1,319	2,380	279,973

SFD = Single Family detached Unit

SFA = Single Family Attached Unit

APT = Apartment Unit (rental or condo)

MH = Mobile Home

AR- SFD = Age-Restricted Single Family Detached Unit

AR-SFA = Age-Restricted Single Family Attached Unit

AR-APT = Age-Restricted Apartment Unit (rental or condo)

PSA = Planned Service Area

TABLE 1

CUMULATIVE HOUSEHOLD POPULATION PUBLIC WATER SERVICE

2015 Totals

Water Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Total
NPS	41,290	0	9	7	29	79	0	
350_Zone	498	69	92	0	0	0	0	
400_Zone	16,743	12,807	8,533	1,617	26	114	0	
550_II_Zone	55,118	26,972	19,475	1,624	7	712	1,464	
550_I_Zone	16,069	4,433	6,776	0	42	256	962	
630_East_Zone	15,490	4,446	4,670	0	0	73	0	
630_South_Zone	391	221	0	0	0	0	0	
630_West_Zone	33,680	8,503	7,808	0	87	412	270	
730_Zone	1,627	1,022	329	0	176	312	339	
TOTAL IN PSA	139,616	58,473	47,683	3,241	338	1,879	3,035	254,265
TOTAL IN COUNTY	180,906	58,473	47,692	3,248	367	1,958	3,035	295,679

SFD = Single Family detached Unit

SFA = Single Family Attached Unit

APT = Apartment Unit (rental or condo)

MH = Mobile Home

AR- SFD = Age-Restricted Single Family Detached Unit

AR-SFA = Age-Restricted Single Family Attached Unit

AR-APT = Age-Restricted Apartment Unit (rental or condo)

PSA = Planned Service Area

TABLE 1**CUMULATIVE HOUSEHOLD POPULATION PUBLIC WATER SERVICE****2020 Totals**

Water Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Total
NPS	43,311	0	9	7	42	79	0	
350_Zone	503	67	90	0	0	0	0	
400_Zone	17,765	13,608	10,772	1,584	26	114	0	
550_II_Zone	57,408	26,984	21,327	1,591	7	771	1,673	
550_I_Zone	16,929	4,415	6,817	0	42	267	1,388	
630_East_Zone	15,423	4,641	4,584	0	0	111	0	
630_South_Zone	822	388	0	0	0	0	0	
630_West_Zone	34,106	8,757	8,324	0	87	736	370	
730_Zone	1,717	1,002	322	0	248	312	339	
TOTAL IN PSA	144,673	59,862	52,236	3,175	410	2,311	3,770	266,437
TOTAL IN COUNTY	187,984	59,862	52,245	3,182	452	2,390	3,770	309,885

SFD = Single Family detached Unit

SFA = Single Family Attached Unit

APT = Apartment Unit (rental or condo)

MH = Mobile Home

AR- SFD = Age-Restricted Single Family Detached Unit

AR-SFA = Age-Restricted Single Family Attached Unit

AR-APT = Age-Restricted Apartment Unit (rental or condo)

PSA = Planned Service Area

TABLE 1

CUMULATIVE HOUSEHOLD POPULATION PUBLIC WATER SERVICE

2025 Totals

Water Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Total
NPS	45,222	12	9	7	42	79	0	
350_Zone	493	66	89	0	0	0	0	
400_Zone	18,797	15,325	12,721	1,553	26	114	0	
550_II_Zone	57,810	27,083	23,349	1,562	7	771	1,673	
550_I_Zone	17,424	4,442	6,764	0	42	267	1,388	
630_East_Zone	15,378	4,548	4,918	0	0	111	0	
630_South_Zone	989	380	0	0	0	0	0	
630_West_Zone	34,055	8,594	8,237	0	87	750	370	
730_Zone	1,757	984	316	0	248	312	339	
TOTAL IN PSA	146,703	61,422	56,394	3,115	410	2,325	3,770	274,139
TOTAL IN COUNTY	191,925	61,434	56,403	3,122	452	2,404	3,770	319,510

SFD = Single Family detached Unit

SFA = Single Family Attached Unit

APT = Apartment Unit (rental or condo)

MH = Mobile Home

AR- SFD = Age-Restricted Single Family Detached Unit

AR-SFA = Age-Restricted Single Family Attached Unit

AR-APT = Age-Restricted Apartment Unit (rental or condo)

PSA = Planned Service Area

TABLE 1

CUMULATIVE HOUSEHOLD POPULATION PUBLIC WATER SERVICE

2030 Totals

Water Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Total
NPS	47,561	12	9	7	42	79	0	
350_Zone	493	66	89	0	0	0	0	
400_Zone	18,826	15,731	14,426	1,553	26	114	0	
550_II_Zone	58,008	27,489	25,493	1,562	7	771	1,673	
550_I_Zone	17,424	4,442	6,764	0	42	267	1,388	
630_East_Zone	15,378	4,548	4,918	0	0	111	0	
630_South_Zone	989	380	0	0	0	0	0	
630_West_Zone	34,063	8,594	8,237	0	87	750	370	
730_Zone	1,803	984	316	0	248	312	339	
TOTAL IN PSA	146,984	62,234	60,243	3,115	410	2,325	3,770	279,081
TOTAL IN COUNTY	194,545	62,246	60,252	3,122	452	2,404	3,770	326,791

SFD = Single Family detached Unit

SFA = Single Family Attached Unit

APT = Apartment Unit (rental or condo)

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AR- SFD = Age-Restricted Single Family Detached Unit

AR-SFA = Age-Restricted Single Family Attached Unit

AR-APT = Age-Restricted Apartment Unit (rental or condo)

PSA = Planned Service Area

TABLE 1**CUMULATIVE HOUSEHOLD POPULATION PUBLIC WATER SERVICE****2035 Totals**

Water Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Total
NPS	49,372	14	9	7	42	79	0	
350_Zone	493	66	89	0	0	0	0	
400_Zone	18,826	15,731	15,456	1,553	26	114	0	
550_II_Zone	58,008	27,489	27,181	1,562	7	771	1,673	
550_I_Zone	17,424	4,442	6,764	0	42	267	1,388	
630_East_Zone	15,378	4,548	4,918	0	0	111	0	
630_South_Zone	989	380	0	0	0	0	0	
630_West_Zone	34,063	8,594	8,237	0	87	750	370	
730_Zone	1,846	984	316	0	248	312	339	
TOTAL IN PSA	147,027	62,234	62,961	3,115	410	2,325	3,770	281,842
TOTAL IN COUNTY	196,399	62,248	62,970	3,122	452	2,404	3,770	331,365

SFD = Single Family detached Unit

SFA = Single Family Attached Unit

APT = Apartment Unit (rental or condo)

MH = Mobile Home

AR- SFD = Age-Restricted Single Family Detached Unit

AR-SFA = Age-Restricted Single Family Attached Unit

AR-APT = Age-Restricted Apartment Unit (rental or condo)

PSA = Planned Service Area

TABLE 1A**NON RESIDENTIAL ACREAGE PUBLIC WATER SERVICE****2035 Totals**

Water Pressure Zone	Industrial Land	Commercial Land
NPS	48.40	514.45
350_Zone	0.10	4.85
400_Zone	3,592.96	1,165.03
550_II_Zone	690.30	2,758.83
550_I_Zone	28.94	445.58
630_East_Zone	61.76	269.86
630_South_Zone	0.00	50.71
630_West_Zone	20.73	381.21
730_Zone	27.33	47.73
TOTAL	4,470.52	5,638.25
Combined TOTAL	10,108.77	

TABLE 1A**NON RESIDENTIAL ACREAGE PUBLIC WATER SERVICE****2010 Totals**

Water Pressure Zone	Industrial Land	Commercial Land
NPS	48.04	397.44
350_Zone	0.10	4.83
400_Zone	2,821.40	960.61
550_II_Zone	504.96	2,374.19
550_I_Zone	28.22	387.41
630_East_Zone	44.10	210.60
630_South_Zone	0.00	16.59
630_West_Zone	20.73	286.31
730_Zone	4.11	44.40
TOTAL	3,471.66	4,682.38
Combined TOTAL	8,154.04	

TABLE 1A**NON RESIDENTIAL ACREAGE PUBLIC WATER SERVICE****2015 Totals**

Water Pressure Zone	Industrial Land	Commercial Land
NPS	48.04	431.09
350_Zone	0.10	4.85
400_Zone	2,977.53	1,013.45
550_II_Zone	536.19	2,542.39
550_I_Zone	28.94	409.06
630_East_Zone	44.10	223.20
630_South_Zone	0.00	40.38
630_West_Zone	20.73	297.90
730_Zone	4.23	46.68
TOTAL	3,659.86	5,009.00
Combined TOTAL	8,668.86	

TABLE 1A**NON RESIDENTIAL ACREAGE PUBLIC WATER SERVICE****2020 Totals**

Water Pressure Zone	Industrial Land	Commercial Land
NPS	48.40	497.35
350_Zone	0.10	4.85
400_Zone	3,207.88	1,080.95
550_II_Zone	614.80	2,658.93
550_I_Zone	28.94	420.99
630_East_Zone	61.76	229.78
630_South_Zone	0.00	45.31
630_West_Zone	20.73	377.00
730_Zone	27.33	47.73
TOTAL	4,009.94	5,362.89
Combined TOTAL	9,372.83	

TABLE 1A

NON RESIDENTIAL ACREAGE PUBLIC WATER SERVICE

2025 Totals

Water Pressure Zone	Industrial Land	Commercial Land
NPS	48.40	514.45
350_Zone	0.10	4.85
400_Zone	3,432.99	1,156.95
550_II_Zone	688.60	2,719.81
550_I_Zone	28.94	445.58
630_East_Zone	61.76	269.86
630_South_Zone	0.00	50.71
630_West_Zone	20.73	381.21
730_Zone	27.33	47.73
TOTAL	4,308.85	5,591.15
Combined TOTAL	9,900.00	

TABLE 1A**NON RESIDENTIAL ACREAGE PUBLIC WATER SERVICE****2030 Totals**

Water Pressure Zone	Industrial Land	Commercial Land
NPS	48.40	514.45
350_Zone	0.10	4.85
400_Zone	3,592.96	1,165.03
550_II_Zone	690.30	2,758.83
550_I_Zone	28.94	445.58
630_East_Zone	61.76	269.86
630_South_Zone	0.00	50.71
630_West_Zone	20.73	381.21
730_Zone	27.33	47.73
TOTAL	4,470.52	5,638.25
Combined TOTAL	10,108.77	

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Table 1B
CUMULATIVE HOUSEHOLD POPULATION
PUBLIC SEWER SERVICE

2035 Totals

Sewer Drainage Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Totals
NPS	48,360	5	9	7	42	79	0	48,502
AR	1,714	2	0	0	87	107	0	1,911
BB1	6,446	274	0	0	0	194	309	7,223
BB2	3,930	9	0	0	0	0	0	3,939
DO	3,904	3,269	1,431	754	0	334	180	9,871
DP1	6,805	7,364	8,215	1,562	0	35	79	24,060
DP2	2,158	826	1,054	0	0	0	0	4,038
DP3	7,326	3,078	2,185	436	0	185	470	13,680
DP4	1,198	222	0	0	0	0	0	1,420
DP5	92	0	0	0	0	0	0	92
GR1	2,889	3,630	1,250	9	26	30	69	7,904
GR2	6	0	709	0	0	0	0	715
HB	10,686	7,206	5,183	354	0	0	238	23,667
LP	32,412	16,658	25,556	0	0	180	351	75,158
MP	18,723	5,403	5,167	0	7	97	285	29,681
NL	5,142	4,923	1,827	0	0	23	0	11,915
PP	754	50	0	0	0	0	0	803
PS	30,110	5,823	4,482	0	290	741	1,097	42,544
SB	7,143	1,584	4,918	0	0	324	638	14,607
TB1	5,466	1,924	278	0	0	72	53	7,793
TB2	1,135	0	706	0	0	0	0	1,841
TOTAL IN PSA	146,325	62,241	62,961	3,115	323	2,216	3,769	280,951
TOTAL IN COUNTY	196,399	62,248	62,970	3,122	453	2,402	3,769	331,363

SFD = Single Family Detached Unit
SFA = Single Family Attached Unit
APT = Apartment Unit (rental or condo)
MH = Mobile Home

NPS = No Planned Service
AR= Alpha Ridge (NPS)
BB = Bonnie Branch
DO = Dorsey Run Pumping Station
DP = Deep Run
GR = Guilford Run
HB = Hammond Branch

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MP = Middle Patuxent
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PS = Rt 108 Pumping Station
SB = Sucker Branch
TB = Tiber Branch

Table 1B
CUMULATIVE HOUSEHOLD POPULATION
PUBLIC SEWER SERVICE

2010 Totals

Sewer Drainage Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Totals
NPS	39,213	0	9	7	29	79	0	39,337
AR	1,532	0	0	0	87	104	0	1,722
BB1	5,040	103	0	0	0	129	304	5,576
BB2	3,603	0	0	0	0	0	0	3,603
DO	3,189	2,821	1,118	762	0	334	180	8,403
DP1	6,475	4,792	3,485	1,657	0	0	0	16,408
DP2	1,775	266	288	0	0	0	0	2,329
DP3	6,484	2,924	2,008	463	0	70	470	12,419
DP4	1,239	211	0	0	0	0	0	1,450
DP5	97	0	0	0	0	0	0	97
GR1	2,037	2,824	1,181	10	26	5	69	6,152
GR2	6	0	0	0	0	0	0	6
HB	8,756	5,304	844	376	0	0	138	15,418
LP	33,834	17,609	16,657	0	0	159	300	68,559
MP	17,383	4,983	5,491	0	7	35	0	27,899
NL	4,376	4,689	1,671	0	0	23	0	10,760
PP	238	0	0	0	0	0	0	238
PS	28,097	4,802	3,216	0	0	247	502	36,865
SB	6,532	1,572	4,916	0	0	135	387	13,543
TB1	5,064	1,918	295	0	0	0	29	7,307
TB2	1,136	0	750	0	0	0	0	1,886
TOTAL IN PSA	135,362	54,819	41,921	3,268	33	1,137	2,379	238,919
TOTAL IN COUNTY	176,106	54,819	41,930	3,275	149	1,320	2,379	279,979

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Table 1B
CUMULATIVE HOUSEHOLD POPULATION
PUBLIC SEWER SERVICE

2015 Totals

Sewer Drainage Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Totals
NPS	41,258	0	9	7	29	79	0	41,382
AR	1,525	0	0	0	87	104	0	1,716
BB1	5,450	143	0	0	0	194	304	6,091
BB2	3,787	0	0	0	0	0	0	3,787
DO	3,307	2,956	1,451	785	0	334	180	9,013
DP1	6,530	5,972	4,910	1,624	0	0	0	19,036
DP2	1,967	536	561	0	0	0	0	3,064
DP3	6,706	3,025	2,060	454	0	185	470	12,901
DP4	1,215	206	0	0	0	0	0	1,421
DP5	96	0	0	0	0	0	0	96
GR1	2,140	2,890	1,158	10	26	30	69	6,323
GR2	6	0	739	0	0	0	0	745
HB	9,440	6,392	1,754	369	0	0	238	18,194
LP	33,680	17,341	18,255	0	0	180	351	69,808
MP	17,761	5,230	5,381	0	7	73	156	28,607
NL	4,516	4,645	1,637	0	0	23	0	10,821
PP	418	0	0	0	0	0	0	418
PS	28,296	5,611	3,864	0	219	559	712	39,260
SB	6,605	1,647	4,889	0	0	135	525	13,800
TB1	5,086	1,880	289	0	0	62	29	7,346
TB2	1,119	0	735	0	0	0	0	1,854
TOTAL IN PSA	138,123	58,474	47,684	3,241	252	1,776	3,034	252,583
TOTAL IN COUNTY	180,905	58,474	47,693	3,248	368	1,959	3,034	295,681

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TB = Tiber Branch

Table 1B
CUMULATIVE HOUSEHOLD POPULATION
PUBLIC SEWER SERVICE

2020 Totals

Sewer Drainage Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Totals
NPS	42,784	0	9	7	42	79	0	42,921
AR	1,603	0	0	0	87	107	0	1,797
BB1	6,151	229	0	0	0	194	309	6,883
BB2	3,887	7	0	0	0	0	0	3,894
DO	3,469	2,907	1,460	769	0	334	180	9,119
DP1	6,727	7,040	6,263	1,591	0	35	79	21,736
DP2	2,115	602	550	0	0	0	0	3,267
DP3	7,043	3,001	2,041	445	0	185	470	13,185
DP4	1,205	214	0	0	0	0	0	1,419
DP5	94	0	0	0	0	0	0	94
GR1	2,539	2,861	1,169	9	26	30	69	6,704
GR2	6	0	724	0	0	0	0	730
HB	10,535	6,527	2,630	361	0	0	238	20,291
LP	33,030	16,994	20,092	0	0	180	351	70,647
MP	18,403	5,229	5,273	0	7	97	285	29,293
NL	4,931	4,812	1,605	0	0	23	0	11,371
PP	635	19	0	0	0	0	0	654
PS	29,409	5,920	4,492	0	290	741	1,097	41,949
SB	7,031	1,616	4,934	0	0	310	638	14,529
TB1	5,259	1,883	284	0	0	72	53	7,551
TB2	1,129	0	720	0	0	0	0	1,849
TOTAL IN PSA	143,596	59,861	52,236	3,176	323	2,202	3,769	265,164
TOTAL IN COUNTY	187,983	59,861	52,245	3,183	453	2,389	3,769	309,883

SFD = Single Family Detached Unit
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NPS = No Planned Service
AR= Alpha Ridge (NPS)
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Revised 03/12

Table 1B
CUMULATIVE HOUSEHOLD POPULATION
PUBLIC SEWER SERVICE

2025 Totals

Sewer Drainage Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Totals
NPS	44,210	2	9	7	42	79	0	44,349
AR	1,617	2	0	0	87	107	0	1,813
BB1	6,446	274	0	0	0	194	309	7,223
BB2	3,930	9	0	0	0	0	0	3,939
DO	3,890	2,988	1,431	754	0	334	180	9,576
DP1	6,805	7,364	7,289	1,562	0	35	79	23,134
DP2	2,158	826	1,037	0	0	0	0	4,021
DP3	7,326	3,078	2,045	436	0	185	470	13,540
DP4	1,198	222	0	0	0	0	0	1,420
DP5	92	0	0	0	0	0	0	92
GR1	2,878	3,630	1,146	9	26	30	69	7,788
GR2	6	0	709	0	0	0	0	715
HB	10,660	6,698	3,732	354	0	0	238	21,682
LP	32,409	16,658	21,778	0	0	180	351	71,378
MP	18,582	5,395	5,167	0	7	97	285	29,533
NL	5,111	4,907	1,675	0	0	23	0	11,715
PP	754	50	0	0	0	0	0	803
PS	30,110	5,823	4,482	0	290	741	1,097	42,544
SB	7,143	1,584	4,918	0	0	324	638	14,607
TB1	5,466	1,924	278	0	0	72	53	7,793
TB2	1,135	0	706	0	0	0	0	1,841
TOTAL IN PSA	146,098	61,429	56,394	3,115	323	2,216	3,769	273,345
TOTAL IN COUNTY	191,925	61,434	56,402	3,122	453	2,402	3,769	319,507

SFD = Single Family Detached Unit
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APT = Apartment Unit (rental or condo)
MH = Mobile Home

NPS = No Planned Service
AR= Alpha Ridge (NPS)
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TB = Tiber Branch

Revised 03/12

Table 1B
CUMULATIVE HOUSEHOLD POPULATION
PUBLIC SEWER SERVICE

2030 Totals

Sewer Drainage Area	SFD	SFA	APT	MH	AR- SFD	AR-SFA	AR-APT	Totals
NPS	46,549	2	9	7	42	79	0	46,688
AR	1,671	2	0	0	87	107	0	1,868
BB1	6,446	274	0	0	0	194	309	7,223
BB2	3,930	9	0	0	0	0	0	3,939
DO	3,904	3,269	1,431	754	0	334	180	9,871
DP1	6,805	7,364	7,801	1,562	0	35	79	23,645
DP2	2,158	826	1,054	0	0	0	0	4,038
DP3	7,326	3,078	2,185	436	0	185	470	13,680
DP4	1,198	222	0	0	0	0	0	1,420
DP5	92	0	0	0	0	0	0	92
GR1	2,889	3,630	1,250	9	26	30	69	7,904
GR2	6	0	709	0	0	0	0	715
HB	10,686	7,206	4,671	354	0	0	238	23,155
LP	32,412	16,658	23,868	0	0	180	351	73,470
MP	18,723	5,403	5,167	0	7	97	285	29,681
NL	5,142	4,923	1,722	0	0	23	0	11,811
PP	754	50	0	0	0	0	0	803
PS	30,110	5,823	4,482	0	290	741	1,097	42,544
SB	7,143	1,584	4,918	0	0	324	638	14,607
TB1	5,466	1,924	278	0	0	72	53	7,793
TB2	1,135	0	706	0	0	0	0	1,841
TOTAL IN PSA	146,325	62,241	60,243	3,115	323	2,216	3,769	278,232
TOTAL IN COUNTY	194,544	62,246	60,251	3,122	453	2,402	3,769	326,788

SFD = Single Family Detached Unit
SFA = Single Family Attached Unit
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MH = Mobile Home

NPS = No Planned Service
AR= Alpha Ridge (NPS)
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LP = Little Patuxent
MP = Middle Patuxent
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SB = Sucker Branch
TB = Tiber Branch

Table 1C

**NON RESIDENTIAL ACREAGE
PUBLIC SEWER SERVICE**

2010 Totals

Sewer Drainage Area	Industrial Land	Commercial Land	Combined
NPS	394.36	48.04	442.40
AR	2.00	0.00	2.00
BB1	2.75	0.00	2.75
BB2	0.00	0.00	0.00
DO	429.26	713.82	1,143.08
DP1	197.26	514.80	712.06
DP2	43.60	18.49	62.09
DP3	169.53	393.53	563.06
DP4	41.74	73.97	115.71
DP5	133.32	97.72	231.04
GR1	414.65	645.34	1,059.99
GR2	37.07	296.28	333.35
HB	256.86	231.06	487.92
LP	1,187.50	370.71	1,558.21
MP	753.13	5.60	758.73
NL	51.25	2.09	53.34
PP	0.07	7.05	7.12
PS	310.18	12.21	322.39
SB	128.86	13.97	142.83
TB1	83.00	26.98	109.98
TB2	45.99	0.00	45.99
Subtotal PSA	4,286.02	3,423.62	7,709.64
Total County	4,682.38	3,471.66	8,154.04

NPS = No Planned Service
 AR= Alpha Ridge (NPS)
 BB = Bonnie Branch
 DO = Dorsey Run Pumping Station
 DP = Deep Run
 GR = Guilford Run
 HB = Hammond Branch

LP = Little Patuxent
 MP = Middle Patuxent
 NL = North Laurel Pumping Station
 PP = Patapsco Park
 PS = Rt 108 Pumping Station
 SB = Sucker Branch
 TB = Tiber Branch

Table 1C

**NON RESIDENTIAL ACREAGE
PUBLIC SEWER SERVICE**

2015 Totals

Sewer Drainage Area	Industrial Land	Commercial Land	Combined
NPS	428.01	48.04	476.05
AR	2.00	0.00	2.00
BB1	2.75	0.00	2.75
BB2	0.00	0.00	0.00
DO	480.99	750.49	1,231.48
DP1	224.40	570.83	795.23
DP2	46.32	21.35	67.67
DP3	182.89	410.32	593.21
DP4	43.04	75.52	118.56
DP5	133.32	128.94	262.26
GR1	439.78	664.38	1,104.16
GR2	38.88	297.08	335.96
HB	362.61	231.06	593.67
LP	1,195.30	389.92	1,585.22
MP	759.99	8.79	768.78
NL	63.06	2.09	65.15
PP	0.07	7.05	7.12
PS	330.69	13.05	343.74
SB	139.29	13.97	153.26
TB1	89.62	26.98	116.60
TB2	45.99	0.00	45.99
Subtotal PSA	4,578.99	3,611.82	8,190.81
Total County	5,009.00	3,659.86	8,668.86

NPS = No Planned Service
 AR= Alpha Ridge (NPS)
 BB = Bonnie Branch
 DO = Dorsey Run Pumping Station
 DP = Deep Run
 GR = Guilford Run
 HB = Hammond Branch

LP = Little Patuxent
 MP = Middle Patuxent
 NL = North Laurel Pumping Station
 PP = Patapsco Park
 PS = Rt 108 Pumping Station
 SB = Sucker Branch
 TB = Tiber Branch

Table 1C

**NON RESIDENTIAL ACREAGE
PUBLIC SEWER SERVICE**

2020 Totals

Sewer Drainage Area	Industrial Land	Commercial Land	Combined
NPS	494.27	48.40	542.67
AR	2.00	0.00	2.00
BB1	7.88	0.00	7.88
BB2	0.00	0.00	0.00
DO	491.47	810.21	1,301.68
DP1	234.86	702.04	936.90
DP2	47.46	24.93	72.39
DP3	186.57	427.13	613.70
DP4	48.23	81.27	129.50
DP5	133.32	134.40	267.72
GR1	459.85	687.52	1,147.37
GR2	38.88	297.08	335.96
HB	447.62	266.30	713.92
LP	1,241.13	409.05	1,650.18
MP	777.03	16.55	793.58
NL	76.17	6.22	82.39
PP	0.07	7.05	7.12
PS	377.85	50.84	428.69
SB	161.16	13.97	175.13
TB1	91.08	26.98	118.06
TB2	45.99	0.00	45.99
Subtotal PSA	4,866.62	3,961.54	8,828.16
Total County	5,362.89	4,009.94	9,372.83

NPS = No Planned Service
 AR= Alpha Ridge (NPS)
 BB = Bonnie Branch
 DO = Dorsey Run Pumping Station
 DP = Deep Run
 GR = Guilford Run
 HB = Hammond Branch

LP = Little Patuxent
 MP = Middle Patuxent
 NL = North Laurel Pumping Station
 PP = Patapsco Park
 PS = Rt 108 Pumping Station
 SB = Sucker Branch
 TB = Tiber Branch

Table 1C

**NON RESIDENTIAL ACREAGE
PUBLIC SEWER SERVICE**

2025 Totals

Sewer Drainage Area	Industrial Land	Commercial Land	Combined
NPS	511.37	48.40	559.77
AR	2.00	0.00	2.00
BB1	7.88	0.00	7.88
BB2	0.00	0.00	0.00
DO	495.84	846.35	1,342.19
DP1	249.85	775.98	1,025.83
DP2	47.76	40.46	88.22
DP3	198.72	471.07	669.79
DP4	52.23	87.20	139.43
DP5	133.32	140.89	274.21
GR1	459.85	739.19	1,199.04
GR2	38.88	310.68	349.56
HB	519.99	292.65	812.64
LP	1,275.53	411.07	1,686.60
MP	777.03	16.55	793.58
NL	76.17	29.52	105.69
PP	0.07	7.05	7.12
PS	421.84	50.84	472.68
SB	185.75	13.97	199.72
TB1	91.08	26.98	118.06
TB2	45.99	0.00	45.99
Subtotal PSA	5,077.78	4,260.45	9,338.23
Total County	5,591.15	4,308.85	9,900.00

NPS = No Planned Service
 AR= Alpha Ridge (NPS)
 BB = Bonnie Branch
 DO = Dorsey Run Pumping Station
 DP = Deep Run
 GR = Guilford Run
 HB = Hammond Branch

LP = Little Patuxent
 MP = Middle Patuxent
 NL = North Laurel Pumping Station
 PP = Patapsco Park
 PS = Rt 108 Pumping Station
 SB = Sucker Branch
 TB = Tiber Branch

Table 1C

**NON RESIDENTIAL ACREAGE
PUBLIC SEWER SERVICE**

2030 Totals

Sewer Drainage Area	Industrial Land	Commercial Land	Combined
NPS	511.37	48.40	559.77
AR	2.00	0.00	2.00
BB1	7.88	0.00	7.88
BB2	0.00	0.00	0.00
DO	495.84	882.00	1,377.84
DP1	249.85	783.38	1,033.23
DP2	47.76	40.46	88.22
DP3	198.72	582.47	781.19
DP4	52.23	87.20	139.43
DP5	133.32	140.89	274.21
GR1	459.85	740.89	1,200.74
GR2	38.88	310.68	349.56
HB	560.69	298.17	858.86
LP	1,275.53	411.07	1,686.60
MP	777.03	16.55	793.58
NL	82.57	29.52	112.09
PP	0.07	7.05	7.12
PS	421.84	50.84	472.68
SB	185.75	13.97	199.72
TB1	91.08	26.98	118.06
TB2	45.99	0.00	45.99
Subtotal PSA	5,124.88	4,422.12	9,547.00
Total County	5,638.25	4,470.52	10,108.77

NPS = No Planned Service
 AR= Alpha Ridge (NPS)
 BB = Bonnie Branch
 DO = Dorsey Run Pumping Station
 DP = Deep Run
 GR = Guilford Run
 HB = Hammond Branch

LP = Little Patuxent
 MP = Middle Patuxent
 NL = North Laurel Pumping Station
 PP = Patapsco Park
 PS = Rt 108 Pumping Station
 SB = Sucker Branch
 TB = Tiber Branch

Table 1C

**NON RESIDENTIAL ACREAGE
PUBLIC SEWER SERVICE**

2035 Totals

Sewer Drainage Area	Industrial Land	Commercial Land	Combined
NPS	511.37	48.40	559.77
AR	2.00	0.00	2.00
BB1	7.88	0.00	7.88
BB2	0.00	0.00	0.00
DO	495.84	882.00	1,377.84
DP1	249.85	783.38	1,033.23
DP2	47.76	40.46	88.22
DP3	198.72	582.47	781.19
DP4	52.23	87.20	139.43
DP5	133.32	140.89	274.21
GR1	459.85	740.89	1,200.74
GR2	38.88	310.68	349.56
HB	560.69	298.17	858.86
LP	1,275.53	411.07	1,686.60
MP	777.03	16.55	793.58
NL	82.57	29.52	112.09
PP	0.07	7.05	7.12
PS	421.84	50.84	472.68
SB	185.75	13.97	199.72
TB1	91.08	26.98	118.06
TB2	45.99	0.00	45.99
Subtotal PSA	5,124.88	4,422.12	9,547.00
Total County	5,638.25	4,470.52	10,108.77

NPS = No Planned Service
 AR= Alpha Ridge (NPS)
 BB = Bonnie Branch
 DO = Dorsey Run Pumping Station
 DP = Deep Run
 GR = Guilford Run
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LP = Little Patuxent
 MP = Middle Patuxent
 NL = North Laurel Pumping Station
 PP = Patapsco Park
 PS = Rt 108 Pumping Station
 SB = Sucker Branch
 TB = Tiber Branch

LAND USE IN HOWARD COUNTY

LAND USE (September 30, 2010)		
Land Use	Acres	Percentage of Total
Developed Residential	55,500	34.5%
Commercial, Industrial, Government, Transportation, Communication, and Utilities	25,043	15.6%
Parks and Open Space	28,042	17.5%
Preservation Easements/Historic Districts	29,255	18.2%
Undeveloped Land (Including non-preserved Ag Land)	22,800	14.2%
TOTAL County Acres	160,640	100.0%

EXISTING ZONING		
Land Use (Undeveloped Land)	Acres	Percentage of Total
RESIDENTIAL	20,788	91.2%
COMMERCIAL	1,048	4.6%
INDUSTRIAL	843	3.7%
GOVERNMENT AND INSTITUTIONAL	120	0.5%
TOTAL	22,800	100.0%

Table 2A

Estimated Enrollments/Population of Schools and Institutions in Howard County - 2011 (1)

Institution	Address Number	Street Name	Street Type	City	Zip	Enrollments/Population	Map Location ID	Type
Hammond	8110	Aladdin	DR	Laurel	20723	522	17	Elem School
Clarksville	12041	Clarksville	PK	Clarksville	21029	527	7	Elem School
Longfellow	5470	Hesperus	DR	Columbia	21044	436	23	Elem School
Bollman Bridge	8200	Savage Guilford	RD	Jessup	20794	587	3	Elem School
Forest Ridge	9550	Gorman	RD	Laurel	20723	718	13	Elem School
Guilford	7335	Oakland Mills	RD	Columbia	21046	518	16	Elem School
Clemens Crossing	10320	Quarterstaff	RD	Columbia	21044	499	8	Elem School
Cradlerock	6700	Cradlerock	WAY	Columbia	21045	465	9	Elem School
Jeffers Hill	6000	Tamar	DR	Columbia	21045	367	20	Elem School
Waterloo	5940	Waterloo	RD	Columbia	21045	759	37	Elem School
Elkridge	7075	Montgomery	RD	Elkridge	21075	844	12	Elem School
St. Johns Lane	2960	Saint Johns	LN	Ellicott City	21042	569	30	Elem School
Waverly	10220	Wetherburn	RD	Ellicott City	21042	578	38	Elem School
Bushy Park	14601	Carrs Mill	RD	Woodbine	21797	648	5	Elem School
West Friendship	12500	Frederick	RD	West Friendship	21794	289	39	Elem School
Pointers Run	6600	South Trotter	RD	Clarksville	21029	650	27	Elem School
Manor Woods	11575	Frederick	RD	Ellicott City	21042	658	24	Elem School
Hollifield Station	8701	Stonehouse	DR	Ellicott City	21043	646	18	Elem School
Fulton	11600	Scaggsville	RD	Fulton	20759	661	14	Elem School
Ilchester	4981	Ilchester	RD	Ellicott City	21043	667	19	Elem School
Triadelphia Ridge	13400	Triadelphia	RD	Ellicott City	21042	422	35	Elem School
Gorman Crossing	9999	Winter Sun	RD	Laurel	20723	639	15	Elem School
Dayton Oaks	4691	Ten Oaks	RD	Dayton	21036	467	10	Elem School
Lisbon	15901	Frederick	RD	Woodbine	21797	467	22	Elem School
Centennial Lane	3825	Centennial	LN	Ellicott City	21042	681	6	Elem School
Northfield	9125	Northfield	RD	Ellicott City	21042	620	25	Elem School
Worthington	4570	Roundhill	RD	Ellicott City	21043	507	40	Elem School
Thunder Hill	9357	Mellenbrook	RD	Columbia	21045	365	34	Elem School
Bryant Woods	5450	Blue Heron	LN	Columbia	21044	358	4	Elem School
Running Brook	5215	West Running Brook	RD	Columbia	21044	412	29	Elem School
Phelps Luck	5370	Oldstone	CT	Columbia	21045	678	26	Elem School
Swansfield	5610	Cedar	LN	Columbia	21044	581	32	Elem School
Talbott Springs	9550	Basket Ring	RD	Columbia	21045	581	33	Elem School
Laurel Woods	9250	North Laurel	RD	Laurel	20723	601	21	Elem School
Rockburn	6145	Montgomery	RD	Elkridge	21075	746	28	Elem School

Table 2A

Estimated Enrollments/Population of Schools and Institutions in Howard County - 2011 (1)

Institution	Address Number	Street Name	Street Type	City	Zip	Enrollments/Population	Map Location ID	Type
Stevens Forest	6045	Stevens Forest	RD	Columbia	21045	305	31	Elem School
Atholton	6700	Seneca	DR	Columbia	21046	475	1	Elem School
Deep Run	6925	Old Waterloo	RD	Elkridge	21075	677	11	Elem School
Veterans	4355	Montgomery	RD	Ellicott City	21043	984	36	Elem School
Hammond	8110	Aladdin	DR	Laurel	20723	545	50	Middle School
Harpers Choice	5450	Beaverkill	RD	Columbia	21044	492	51	Middle School
Wilde Lake	10481	Cross Fox	LN	Columbia	21044	517	59	Middle School
Clarksville	6535	South Trotter	RD	Clarksville	21029	683	43	Middle School
Patuxent Valley	9151	Vollmerhausen	RD	Jessup	20794	678	58	Middle School
Oakland Mills	9540	Kilimanjaro	RD	Columbia	21045	391	56	Middle School
Patapsco	8885	Old Frederick	RD	Ellicott City	21043	595	57	Middle School
Ellicott Mills	4445	Montgomery	RD	Ellicott City	21043	671	47	Middle School
Dunloggin	9129	Northfield	RD	Ellicott City	21042	529	45	Middle School
Glenwood	2680	Rt 97		Glenwood	21738	602	49	Middle School
Elkridge Landing	7085	Montgomery	RD	Elkridge	21075	691	46	Middle School
Murray Hill	9989	Winter Sun	RD	Laurel	20723	721	55	Middle School
Mayfield Woods	7950	Red Barn	WAY	Elkridge	21075	712	53	Middle School
Bonnie Branch	4979	Ilchester	RD	Ellicott City	21043	659	41	Middle School
Folly Quarter	13500	Triadelphia	RD	Ellicott City	21042	587	48	Middle School
Mount View	12101	Woodford	DR	Marriottsville	21104	677	54	Middle School
Lake Elkhorn	6700	Cradlerock	WAY	Columbia	21045	450	52	Middle School
Lime Kiln	11650	Scaggsville	RD	Fulton	20759	621	52	Middle School
Burleigh Manor	4200	Centennial	LN	Ellicott City	21042	635	42	Middle School
Atholton	6520	Freetown	RD	Columbia	21044	1,454	60	High School
Centennial	4300	Centennial	LN	Ellicott City	21042	1,475	61	High School
Glenelg	14025	Burntwoods	RD	Glenelg	21737	1,227	62	High School
Hammond	8800	Guilford	RD	Columbia	21046	1,323	63	High School
Howard	8700	Old Annapolis	RD	Ellicott City	21043	1,624	64	High School
Long Reach	6101	Old Dobbin	LN	Columbia	21045	1,204	65	High School
Marriotts Ridge	12100	Woodford	DR	Marriottsville	21104	1,301	66	High School
Mt. Hebron	9440	Old Frederick	RD	Ellicott City	21042	1,467	67	High School
Oakland Mills	9410	Kilimanjaro	RD	Columbia	21045	1,156	68	High School
River Hill	12101	Clarksville	PK	Clarksville	21029	1,419	70	High School
Wilde Lake	5460	Trumpeter	RD	Columbia	21044	1,286	71	High School

Table 2A

Estimated Enrollments/Population of Schools and Institutions in Howard County - 2011 (1)

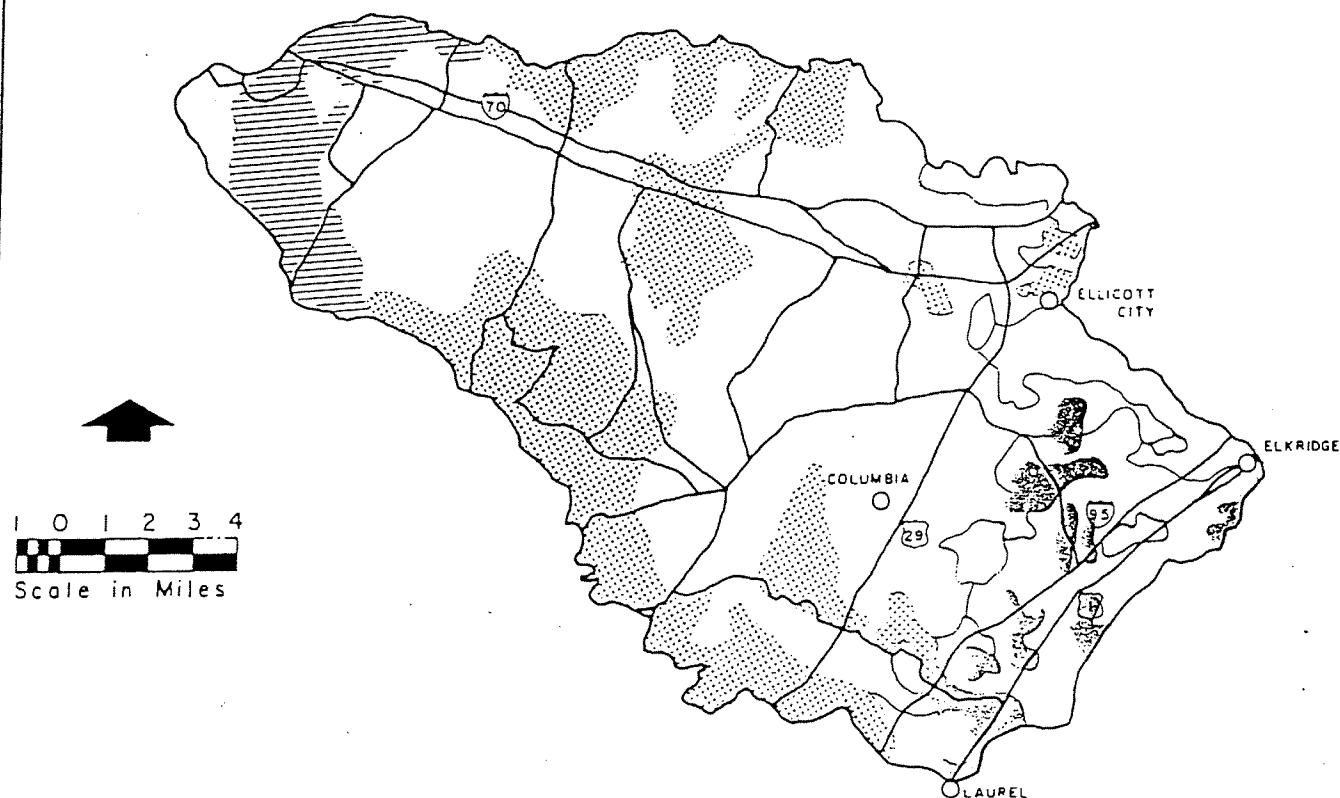
Institution	Address Number	Street Name	Street Type	City	Zip	Enrollments/Population	Map Location ID	Type
Reservoir	11550	Scaggsville	RD	Fulton	20759	1,492	69	High School
Cedar Lane	11630	Scaggsville	RD	Fulton	20759	102	72	Special School
Homewood	10914	State Route 108		Ellicott City	21042	145	74	Special School
Applications & Research Lab	10920	State Route 108		Ellicott City	21042	558	73	Special School
Howard Community College	10901	Little Patuxent	Pkwy	Columbia	21044	9,500	75	College
JHU Engineering for Professionals	6810	Deerpath	Rd	Columbia	21044	2,974	76	College
Loyola University	8890	McGaw	Rd	Columbia	21045	345	77	College
University College	6865	Deerpath	Rd	Elkridge	21075	100	78	College
University of Phoenix	8830	Stanford	Blvd	Columbia	21045	1,000	79	College
Tai Sophia	7750	Montpelier	Rd	Laurel	20723	500	80	College
Clifton T Perkins	8450	Dorsey Run	Rd	Jessup	20794	236	114	Group
Encore - Turf Valley	11150	Resort	Rd	Ellicott City	21042	157	115	Group
Harmony Hall	6336	Cedar	Ln	Columbia	21044	235	116	Group
Heartlands	3004	North Ridge	Rd	Ellicott City	21043	250	117	Group
Howard County Detention Center	7301	Waterloo	Rd	Jessup	20794	250	118	Group
Howard County General Hospital	5755	Cedar	Ln	Columbia	21044	180	119	Group
Lorien Nursing Home	6334	Cedar	Ln	Columbia	21044	209	120	Group
Ellicott City Health & Rehab	3000	North Ridge	Rd	Ellicott City	21043	182	122	Group
Sunrise Assisted Living at Hickory Ridge	6500	Freetown	Rd	Columbia	21044	96	123	Group
Shepherd Pratt	4100	College	Ave	Ellicott City	21043	45	124	Group
Vantage House Life Care Facility	5400	Vantage Point	Rd	Columbia	21044	260	125	Group
Morningside House	5330	Dorsey Hall	Dr	Ellicott City	21042	119	127	Group
Lighthouse Senior Living	3100	North Ridge	Rd	Ellicott City	21043	34	128	Group
Shangrila	4475	Montgomery	Rd	Ellicott City	21043	55	129	Group
Somerford Place	8220	Snowden River	Pkwy	Columbia	21045	64	130	Group
Atholton Adventist School	6520	Martin	Rd	Columbia	21044	178	81	Other
Bet Yeladim, Inc.	8910	State Route 108		Columbia	21045	160	82	Other
Bethel Christian Academy 5-8	9001	Vollmerhausen	Rd	Jessup	20794	95	83	Other
Bethel Christian Academy K-4	8455	Savage-Guilford	Rd	Savage	20763	215	84	Other
Brookfield Christian School	6347	Ten Oaks	Rd	Clarksville	21029	165	85	Other
Bryant Woods Montessori	10449	Green Mountain	Cir	Columbia	21044	35	86	Other
Chapelgate Christian Academy	2600	Marriottsville	Rd	Marriottsville	21104	374	87	Other

Table 2A

Estimated Enrollments/Population of Schools and Institutions in Howard County - 2011 (1)









Institution	Address Number	Street Name	Street Type	City	Zip	Enrollments/Population	Map Location ID	Type
Children's Manor Montessori School	9008	Red Branch	Rd	Columbia	21045	325	89	Other
Children's World Learning Center (Kinder Care)	7195	Columbia Gateway	Dr	Columbia	21046	70	89	Other
Columbia Academy	10350	Old Columbia	Rd	Columbia	21046	250	90	Other
Columbia Montessori School	10508	Marble Faun	Ct	Columbia	21044	76	91	Other
Glenelg Country School	12793	Folly Quarter	Rd	Ellicott City	21042	800	92	Other
Goddard School	9100	Quarterstaff	Pkwy	Columbia	21045	120	93	Other
Julia Brown Montessori School	9760	Owen Brown	Rd	Columbia	21045	100	94	Other
KinderCare Learning Center	7195	Columbia Gateway	Dr	Columbia	21046	80	95	Other
Kinder Ridge	8251	Tamar	Dr	Columbia	21046	152	96	Other
Lincoln Tech	9325	Snowden River	Pkwy	Columbia	21046	839	97	Other
Linwood Children's Center	3421	Martha Bush	Dr	Columbia	21043	89	98	Other
Celebration Christian Academy	6080	Foreland	Garth	Columbia	21045	57	99	Other
Lornwood	10453	Green Mountain	Cir	Columbia	21044	68	100	Other
Love of Learning Montessori School	9151	Rumsey	Rd	Columbia	21045	125	101	Other
Maryland School for the Deaf	8169	Old Montgomery	Rd	Columbia	21044	103	102	Other
Mt. Airy Christian Academy	16700	Old Frederick	Rd	Mt Airy	21771	285	103	Other
Nature's Way Children's Center	5890	Cedar	Ln	Columbia	21044	71	104	Other
Our Lady of Perpetual Help	4801	Ilchester	Rd	Ellicott City	21043	235	105	Other
Peter Pan Learning Center	1260	Driver	Rd	Marriottsville	21104	62	106	Other
Resurrection/St. Paul's School	3155	Paulskirk	Dr	Ellicott City	21042	534	107	Other
School for Contemporary Education	8920	Whiskey Bottom	Rd	Laurel	20723	95	108	Other
St. John's Parrish Day School	9130	Frederick	Rd	Ellicott City	21042	360	110	Other
St. Louis School	12500	State Route 108		Clarksville	21029	505	111	Other
Trinity School	4985	Ilchester	Rd	Ellicott City	21043	392	112	Other
The Young School	8310	Guilford	Rd	Columbia	21046	170	113	Other

(1) Used for 2011 Water and Sewer Master Plan Update.



HOWARD COUNTY, MARYLAND

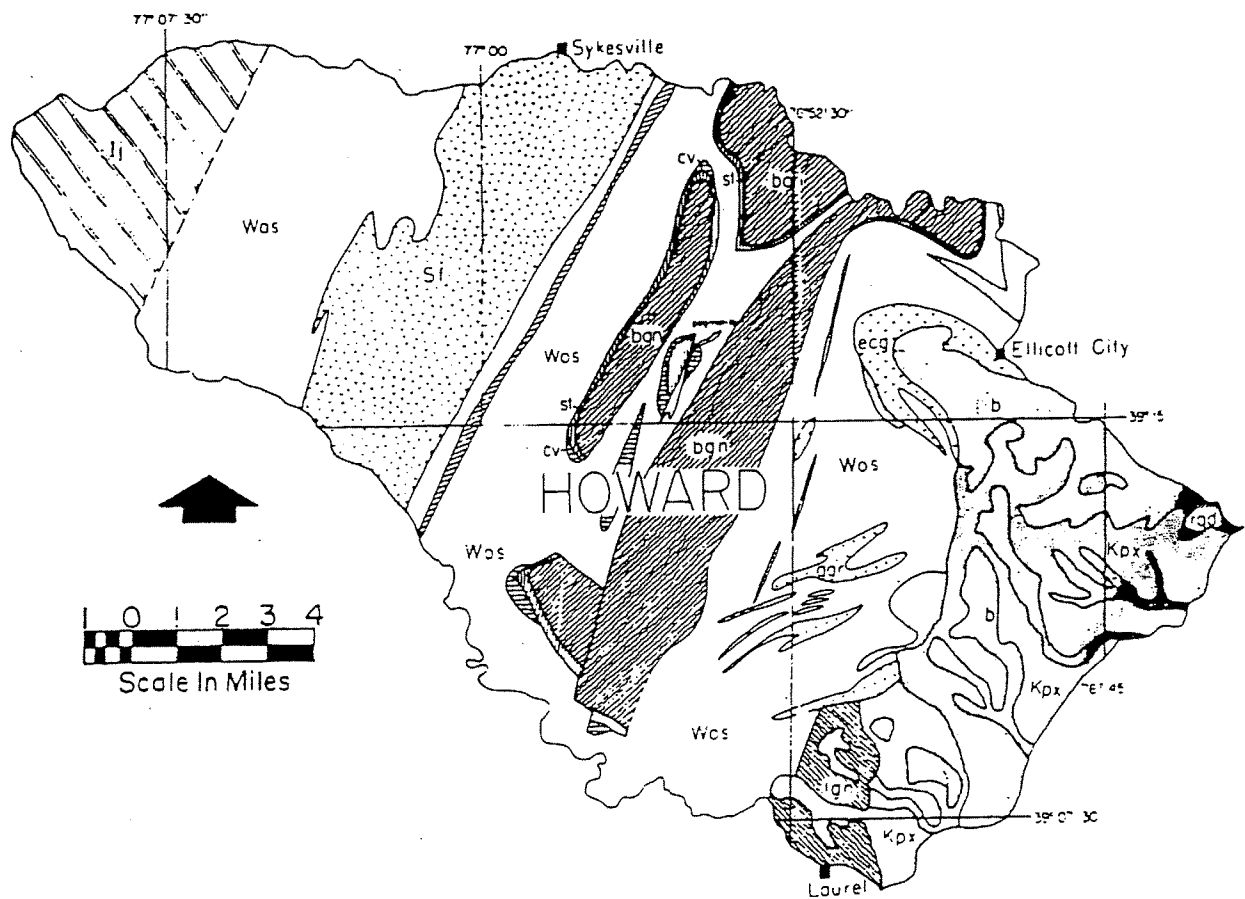
GENERALIZED SOILS MAP

-  MT. AIRY-LINGANORE-GLENELG ASSOCIATION : DOMINANTLY MODERATELY DEEP, SOMEWHAT EXCESSIVELY DRAINED AND WELL-DRAINED, MODERATELY SLOPING TO STEEP SOILS
-  MT. AIRY-GLENELG-CHESTER ASSOCIATION: MODERATELY DEEP AND DEEP, SOMEWHAT EXCESSIVELY DRAINED AND WELL-DRAINED, MODERATELY SLOPING TO STEEP SOILS
-  GLENELG-CHESTER-MANOR ASSOCIATION: DEEP, WELL-DRAINED, GENTLY SLOPING AND SLOPING SOILS
-  GLENELG-CHESTER-MANOR ASSOCIATION: DEEP, WELL-DRAINED, MODERATELY STEEP AND STEEP SOILS
-  NESHAMINY-MONTALTO ASSOCIATION: DEEP, WELL-DRAINED, MODERATELY SLOWLY PERMEABLE, GENTLY SLOPING TO STEEP SOILS
-  RELAY-BRANDYWINE-LEGORE ASSOCIATION: DEEP AND MODERATELY DEEP, WELL-DRAINED, STEEP AND VERY STEEP SOILS, MOSTLY VERY STONY
-  BELTSVILLE-CHILLUM-SASSAFRAS ASSOCIATION: DEEP, MODERATELY WELL-DRAINED AND WELL DRAINED, GENTLY SLOPING TO STRONGLY SLOPING SOILS OF COASTAL PLAIN
-  SASSAFRAS-CHILLUM-AURA ASSOCIATION: DEEP, WELL-DRAINED SOILS THAT HAVE A MODERATELY PERMEABLE SUBSOIL, AND MODERATELY DEEP, WELL-DRAINED SOILS THAT HAVE A COMPACT SUBSOIL OR SUBSTRATUM

REVISED JUNE 15, 1981

FIGURE 3

GEOLOGY OF HOWARD COUNTY MARYLAND



EXPLANATION

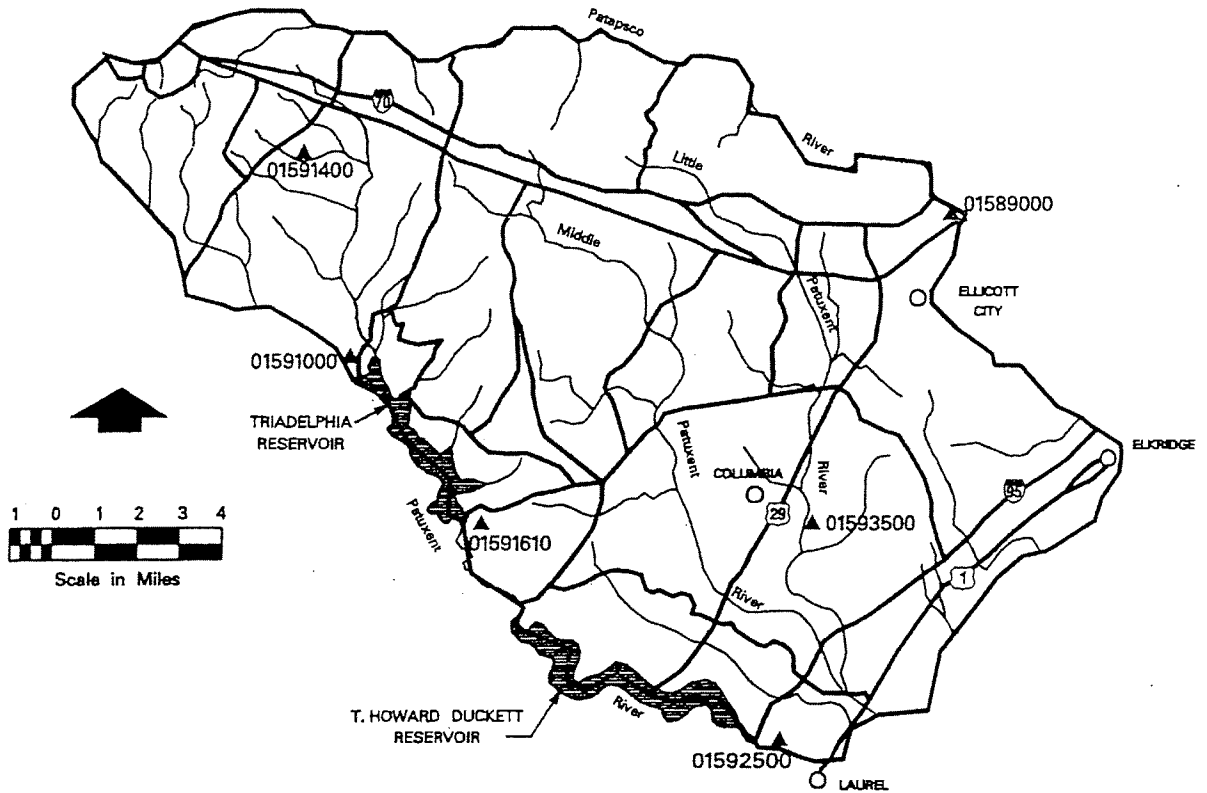
Lower Pleistocene, Pleistocene and Recent	Qa	Alluvium	Quaternary	Qf	Bear Island granodiorite	Age uncertain*	Was	Wissahickon formation
	Qc	Terrace gravels		Qg	Kensington granite gneiss		Was	Wissahickon formation, diopside-mica facies
	Tbm	Bryn Mawr gravel		ecg	Ellicott City granite		Si	Llansville phyllite
	Kp	Patuxent formation		gg	Gullford granite		Sl	Sykesville formation
	Pa	Diabase		rad	Relay quartz diorite		La	Laurel gneiss
Upper Triassic	Pa	Diabase	Triassic	so	Serpentine	Age uncertain*	ecv	Cockeysville marble
	Pa	Newark group, largely New Oxford formation		e	Basic igneous rocks, includes gabbro		Sl	Sellers formation
	Ch	Harpers phyllite					bgn	Baltimore gneiss

* Arrangement of units does not necessarily indicate chronological sequence

NOTE:

TAKEN FROM BULLETIN NO. 14, WATER RESOURCES
OF HOWARD AND MONTGOMERY COUNTIES.
MARYLAND GEOLOGICAL SURVEY.

SURFACE WATER PATTERNS



HOWARD COUNTY, MARYLAND

GAGE NO.	STREAM	DRAINAGE AREA	AVERAGE DISCHARGE	MAXIMUM DISCHARGE	MINIMUM DISCHARGE
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01589000	PATAPSCO	285 SQ. MILES	*	80,600 cfs	6.00 cfs
01591000	PATUXENT	34.8 SQ. MILES	39.4 cfs	21,8000 cfs	0.20 cfs
01592500	PATUXENT	132 SQ. MILES	**	26,000 cfs	0.05 cfs
01593500	PATUXENT	38 SQ. MILES	42.6 cfs	12,400 cfs	0.00 cfs
01591610	PATUXENT	78.6 SQ. MILES	**	17,800 cfs	1.20 cfs
01591400	PATUXENT	22.9 SQ. MILES	24.9 cfs	4,000 cfs	1.80 cfs

* FLOW REGULATED BY LIBERTY RESERVOIR

** FLOW REGULATED BY TRIADELPHIA AND T. HOWARD DUCKETT RESERVOIRS

FIGURE 5

Howard County MARYLAND

STREAM USE

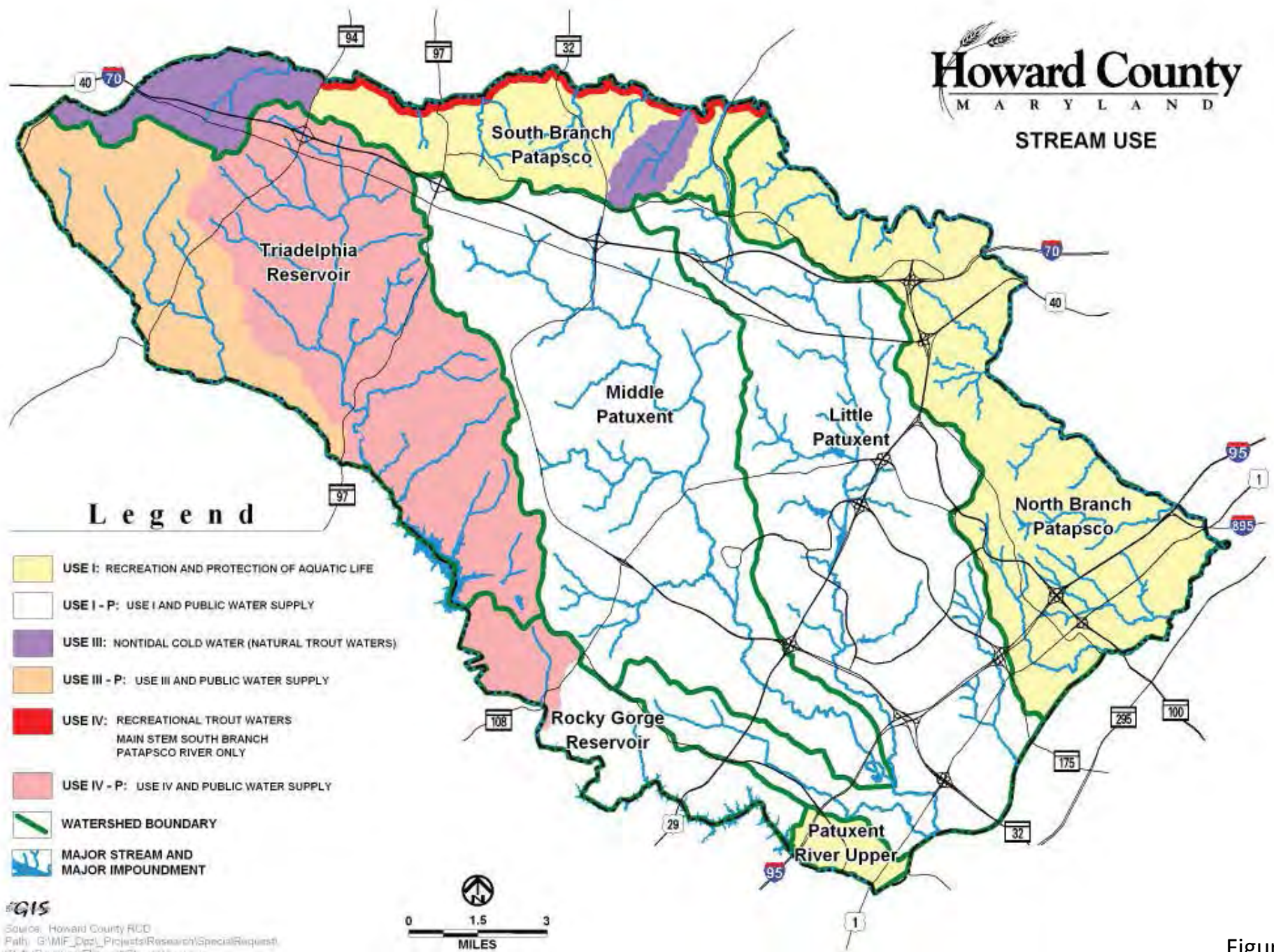
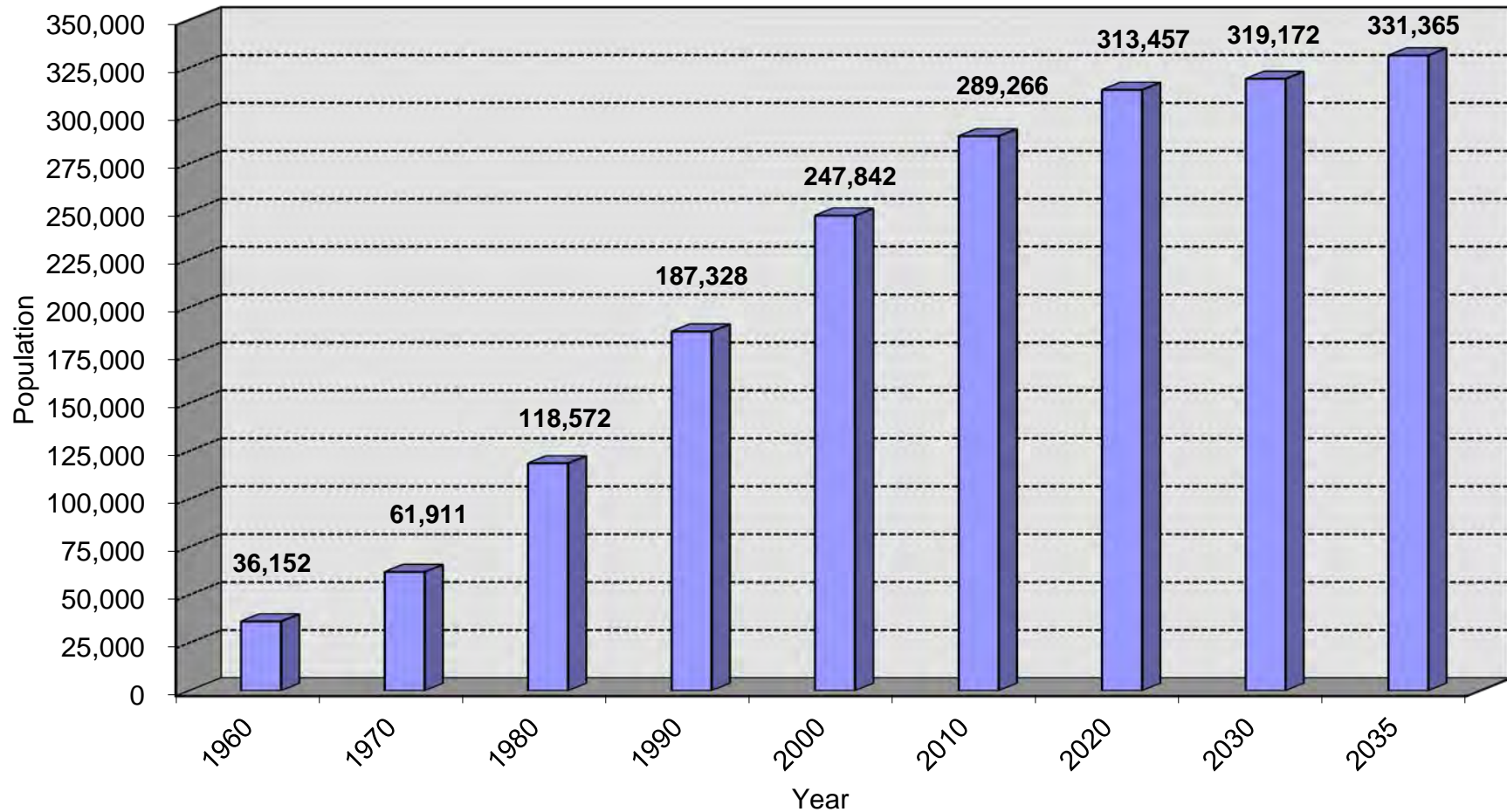


Figure 6

Howard County Population Growth 1960 to 2035



Source: US Census Bureau, DPZ (Round 7C)

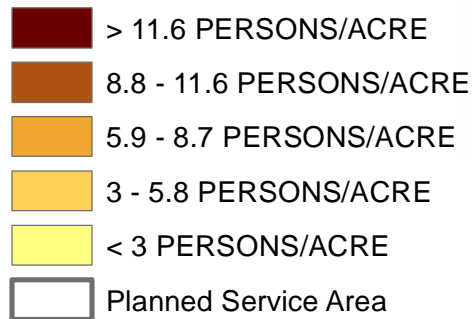
Figure 7

Howard County

M A R Y L A N D

2010

Population Per Acre

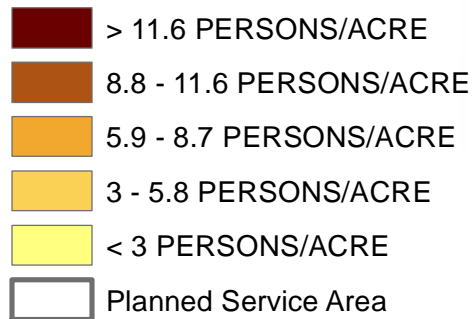


Howard County

M A R Y L A N D

2020

Population Per Acre

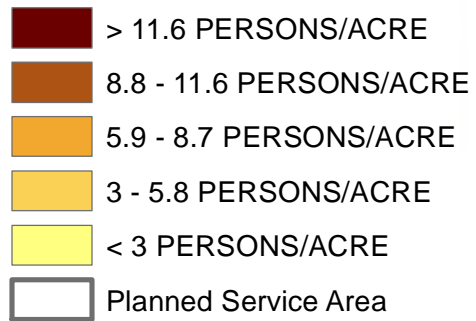


Howard County

M A R Y L A N D

2030

Population Per Acre



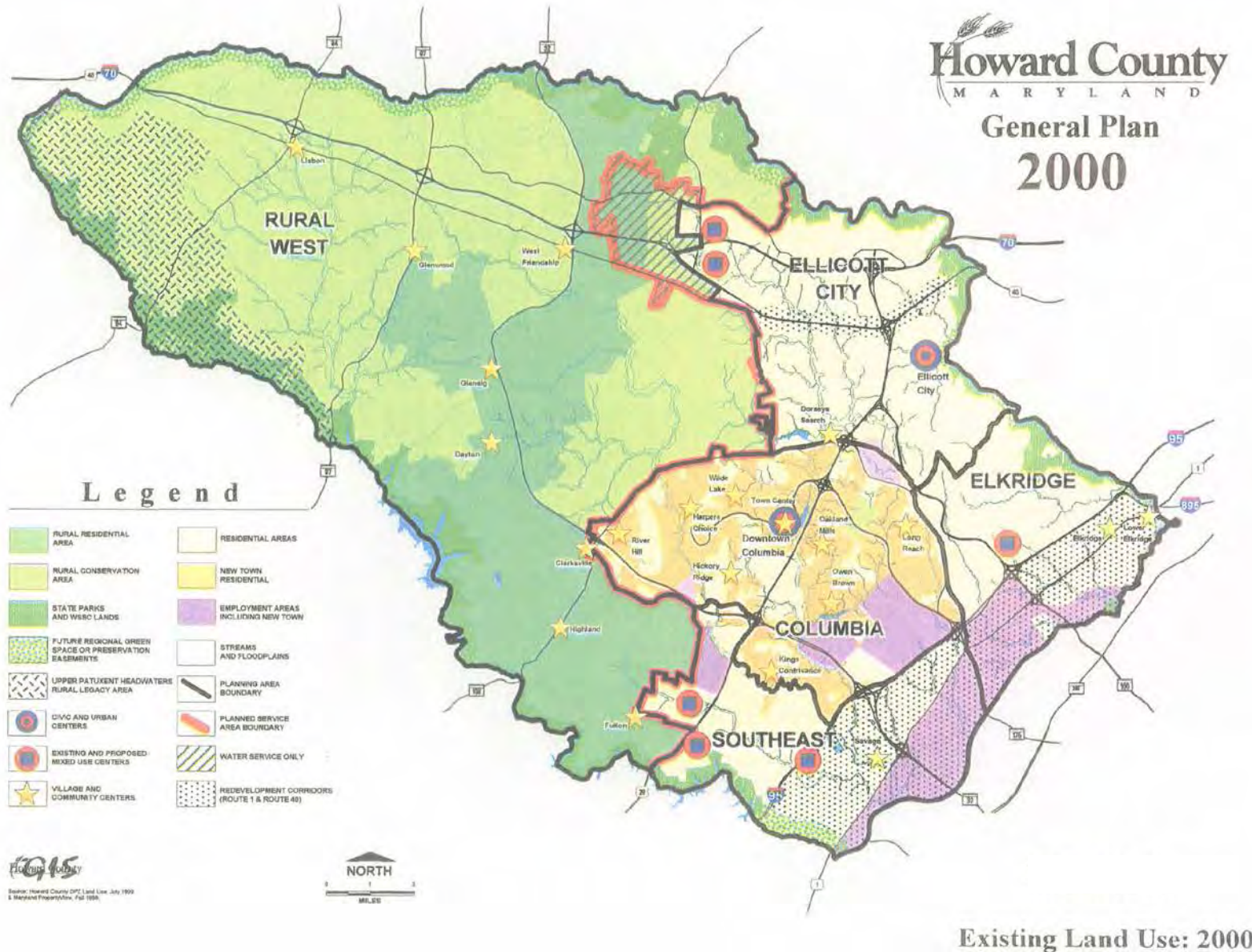
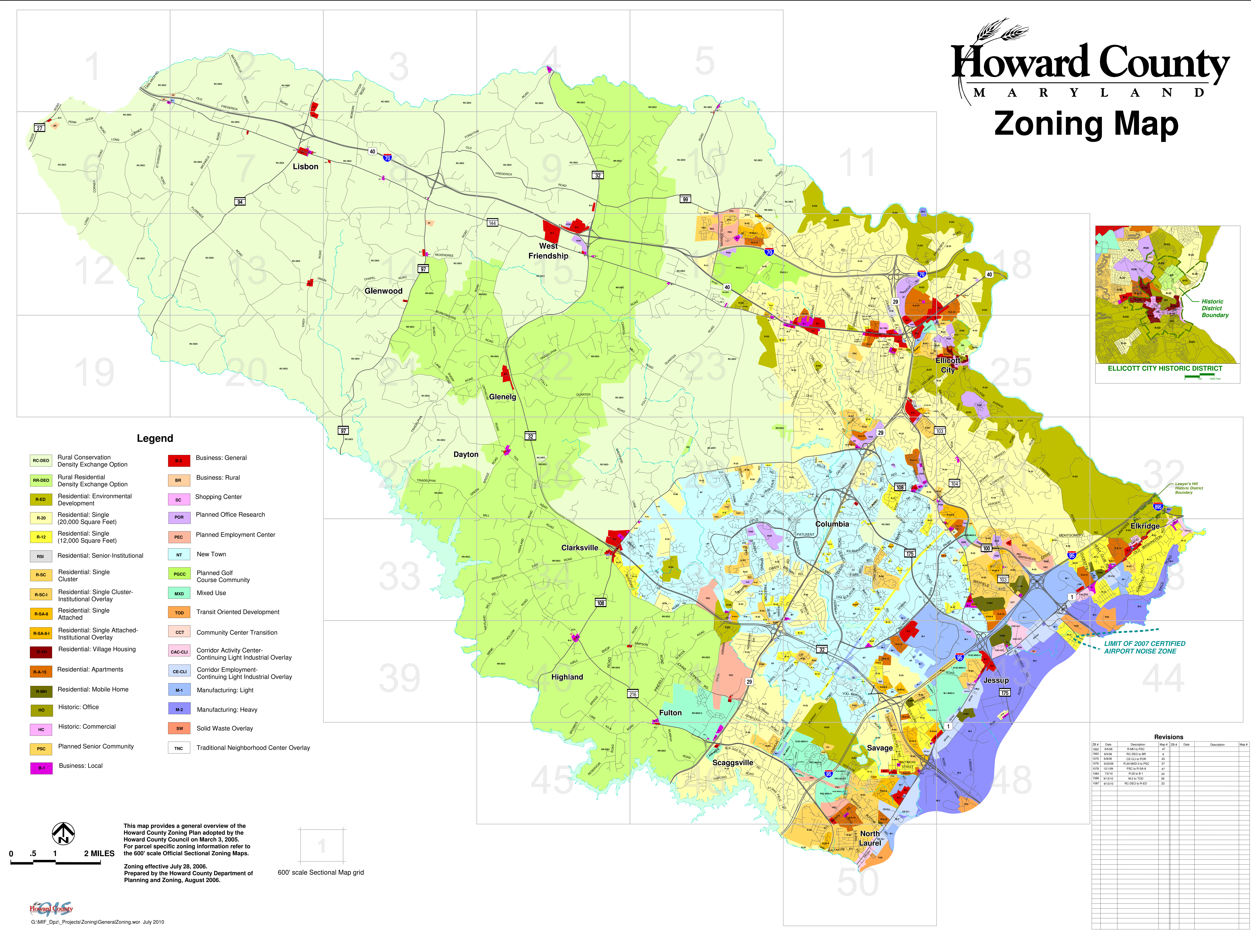
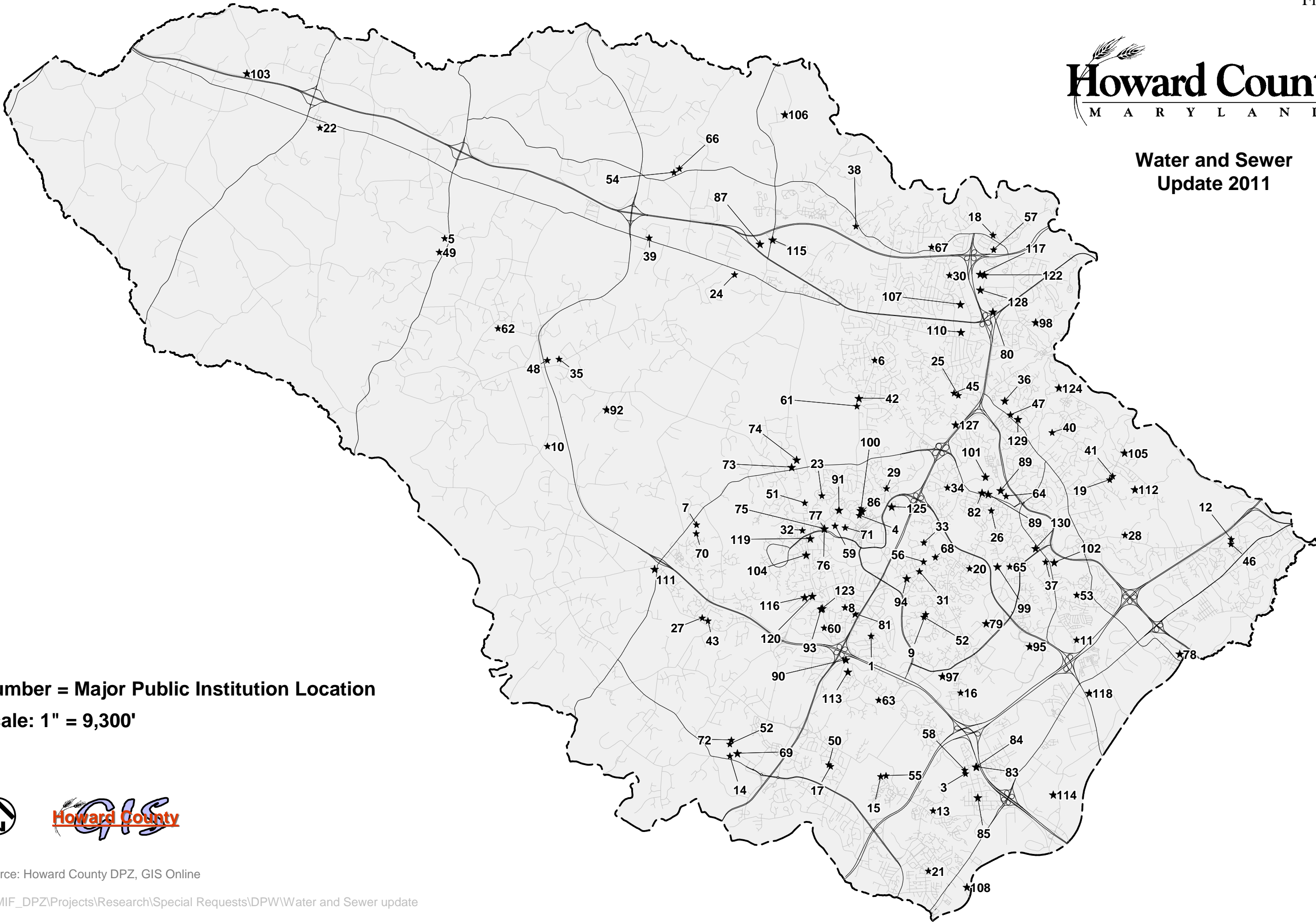


Figure 11



Number = Major Public Institution Location
Scale: 1" = 9,300'



CHAPTER 3

THE WATER PLAN

The purpose of this Chapter is to review the County's existing water system and determine the County's future water system requirements. Howard County depends upon Baltimore City and the Washington Suburban Sanitary Commission (WSSC) for all of its public potable water supply. The basis for these supplies is a series of negotiated legal agreements.

Water Requirements

The present average daily water requirement for the County is estimated at 28.5 million gallons per day (MGD). Approximately 25.6 MGD is supplied through the public system, which serves 86% of the County's population. The remainder of the County population is served by private wells or surface water supplies that produce an estimated 2.9 MGD. The projected population served by the system is listed in Table 1, Chapter 2.

Existing water meter records are used to determine residential consumption, commercial/industrial consumption, and public consumption. Table 3A "Average Daily Water Demand" shows the portion of total water use for each usage category through the year 2035. Existing unaccountable water use is determined as the difference between water usage metered in Howard County and water purchased by Howard County from Baltimore City and WSSC, less other non-metered authorized uses. Unaccountable water use includes leaks, water main breaks, storage tank overflows, meter under-registration, and theft. Howard County's unaccountable water for the calendar years 2007, 2008, and 2009 was 9.9%, 10.2%, and 8.9%, respectively. For future years, unaccountable water use is determined as a percentage of projected total use since it will increase as total water use increases and the distribution system expands.

Table 3 "Projected Water Supply Demands and Planned Capacity" compares the population and total water use projections from Table 3A to contracted supplies at the County's connections with Baltimore County and WSSC. Included is an estimate of the future contracted supply at each connection for each design year, through the year 2035. Capacity increases at each connection will depend on multi-jurisdictional legal agreements and financial commitments as described previously.

Table 3B "Projected Average Daily Demand and Contracted Average Daily Supply" makes a direct comparison between contracted supply limitations and the projected demand at each connection. Projected demand in this case is the demand determined by hydraulic analysis of the water system. This computerized analysis allows water tanks to fill or empty and pumped flows to vary with discharge head over an extended period. The analysis is discussed in greater detail later in this chapter.

Existing Water Supply Facilities

Howard County's water system is the only public water system within the County. The other facilities in the County, as listed in Table 6, are relatively small privately owned systems. Withdrawals from private well systems and the few surface water supplies are expected to decrease from their present rates in the eastern portion of the County, as the public system expands. This is the result of users in the Metropolitan District abandoning their private wells and connecting to the public system. No other significant well supplies are anticipated.

The City of Baltimore and WSSC supply all of the potable water to the Howard County public system. The County's system is currently supplied through four (4) connections to the Baltimore County water system (which in turn is supplied from the Baltimore City system) and through one (1) connection from WSSC's system. Howard County both owns and operates the distribution system within its boundaries. The development, operation and maintenance of the

water supply facilities, treatment plants, and distribution system located outside of Howard County are the responsibility of Baltimore County, Baltimore City or WSSC as appropriate. Howard County participates in the planning, development, and capital costs of improvements to the public potable water system with these other jurisdictions.

Howard County's Existing Water System

Howard County's existing water system is divided into nine water pressure zones. Areas are placed in the water pressure zones based on ground elevations. The water supplied to each zone is maintained at a pressure sufficient to provide adequate service to the homes and businesses in each zone. Each zone is supplied by one or more water pumping stations or pressure reducing valves, which are needed to raise or lower the water pressures adequately to maintain pressure and fire flow capabilities in that zone. A schematic of Howard County's existing water system is included as Figure 13.

A) 300 Pressure Zone

This pressure zone consists of lower Elkridge. Two 2-inch and 6-inch Pressure Regulating Valves (PRVs) located in the same vault provide domestic service and fire protection for the zone from the 400 Zone, with a pressure relief valve for over-pressure protection. There is no water storage in this zone.

B) 350 Pressure Zone

This zone consists of historic Ellicott City. There are no water storage tanks in this zone, and three PRVs; Main Street PRV, College Ave PRV, and Sarah's Lane PRV serve this zone from the 550 Zone. A pressure relief valve located near the Main Street PRV provides over- pressure protection for the zone.

C) 400 Pressure Zone

The 400 pressure zone extends from North Laurel in the south, to Elkridge in the north, east of Interstate 95. Water storage in this pressure zone consists of one existing tank, the Greater Baltimore Food Market (GBFM) Elevated Water Tank (EWT), and one future tank, the new Guilford EWT, currently in design under capital project W-8262. The storage capacity of each tank is 0.75 and 2.0 million gallons (MG) respectively. The 400 Zone has two main supplies, including the WSSC supply through the All Saints Water Pumping Station (WPS) (gravity service and pumped), and the River Road/Gun Road supply from Baltimore City (through the River Road PRV). In addition, pressure regulating valves at Meadowridge Road, Hunt Club Road, Huntington East, Gorman Road, and Whiskey Bottom Road supply water from the 550 Zone. Two standby pumping stations, Rt. 32 WPS and Whiskey Bottom WPS, are available to provide supply from the 400 Zone to the 550 Zone.

D) 550 Pressure Zone

This is the Howard County water system's primary pressure zone with water storage consisting of two elevated water tanks; Snowden River EWT, and Scaggsville EWT with capacities of 2.0 and 3.0 MG respectively. This zone encompasses the center part of the County's metropolitan district and extends from Ellicott City in the north to Scaggsville in the south along the US Rt. 29 corridor, encompassing most of Columbia. Water from Baltimore City's Western Third Zone enters the 550 Zone from the 20 MG Catonsville reservoir by gravity through parallel 48 and 24-inch connections along US Route 40 at a maximum gradient elevation of 567 feet. The Rt. 29 pumping station delivers water to both tanks, and can be controlled from the level of either tank.

A second water supply for the 550 Zone is from the Baltimore City Second Zone via the Southwest Transmission Main (Elkridge connection) that has a maximum gradient elevation of 353 feet. The supply is pumped into the 550 Zone by the Elkridge pumping station, with a maximum supply rate of 18 MGD.

Water from the 550 Zone is redistributed to the other pressure zones by water pumping stations (WPS, for higher elevations) or pressure regulating valves (PRV, for lower elevations).

E) 560 Pressure Zone

This pressure zone was established to serve the Hollifield Estates subdivision on Old Frederick Road. Three (3) inch and six (6) inch PRVs, located in the same vault, provide domestic service and fire protection for the zone from the 630 West Zone. There is no water storage in this zone.

F) 630 East Pressure Zone

The 630 East pressure zone consists of the Oakland Ridge area bounded by the southern part of Ellicott City to the north, College Avenue to the east, Rt. 29 to the west, and Rt. 175 to the south. This zone utilizes two existing elevated water tanks; Oakland Ridge and Jonestown, 1.5 and 0.2 MG respectively. Two pumping stations serve this zone and draw suction from the 550 Zone, Montgomery Road WPS and Edgar Road WPS.

G) 630 West Pressure Zone

The 630 West pressure zone encompasses the northern and western sections of Ellicott City, and extends south covering the western part of Columbia and Clarksville. Storage in this zone consists of two existing elevated water tanks;

Bethany EWT and Harpers Choice EWT, 0.2 and 1.0 MG respectively. Three pumping stations serve this zone and draw suction from the 550 Zone; Chestnut Hill Water Pumping Station (WPS), Pine Orchard WPS, and Columbia WPS. A new elevated water tank, the Marriottsville Road EWT, with a 1.25 MG storage capacity is currently in design under capital project W-8263.

H) 630 South Pressure Zone

The Hammond Branch Extended area (Fulton Area) was recently added to the Planned Service Area, and is located west of Rte 29 between Rte 216 and Johns Hopkins Road. The western boundary of this area is just east of Pindell School Road. Approximately one-third of this area could be served by extension of existing mains in the 550 Zone. However, the remaining portions are too high in elevation to be served from this zone, and a new pressure zone, the 630 South Zone, was created to serve this area. The Rt. 216 pumping station, with a capacity of 0.3 MGD, and the Maple Lawn pumping station, with a capacity of 0.3 MGD, provide water for the 630 South Zone from the 550 Zone.

The new 0.5 MGD Fulton tank was constructed along Rt. 216 to serve the 630 South Zone. Plans include ultimately linking the 630 South and 630 West Zones hydraulically.

I) 730 Pressure Zone

The 730-pressure zone is in the area of Ellicott City west of Marriottsville Road. This zone contains one elevated water tank, the Alpha Ridge EWT with 0.3 MG storage capacity. One pumping station drawing from the 630 West Zone, the Frederick Road WPS, serves this zone. This zone is mostly in a “water only” area, with public sewer not available. An upgrade to the Frederick Road pumping station is planned under capital project W-8264, and a new pumping

station, the Marriottsville WPS, to serve the zone is to be constructed in conjunction with the Marriottsville Road EWT under capital project W-8263 (which will serve the 630 West Zone).

City of Baltimore

The primary source of water to Howard County from the City of Baltimore is the Ashburton Filtration Plant. The Ashburton Plant was placed in service in 1956 and is located on Druid Park Drive in Baltimore City. This plant has a raw water treatment capacity (peak) of 165 MGD, with four flocculators, four sedimentation basins, and twenty rapid sand filters.

The raw water supply to the Ashburton Filtration Plant is Liberty Reservoir located on the north branch of the Patapsco River. The reservoir has a storage capacity of 43 billion gallons and a safe yield of 93.0 MGD. Water from Liberty Reservoir flows by gravity through a concrete lined tunnel, 13 miles in length and 10 feet in diameter, to the filtration plant where it is stored in the 220 million gallon capacity Lake Ashburton Reservoir.

Water supplied to Howard County is pumped by the Ashburton and Leakin Park Pumping Stations. The Ashburton Pumping Station houses four 28 MGD pumps and has an apparent safe capacity of 84 MGD. However, system hydraulic constraints limit the maximum safe pumping station output (with three pumps operating and one pump held in reserve) to approximately 81 MGD. This flow rate was realized during the maximum day demand which occurred in June, 1986.

The Leakin Park Pumping Station, which went into operation in 1991 and was expanded in 2007, houses five 20 MGD pumps. The current safe capacity of the station is 80 MGD, using four pumping units with one standby unit.

The maximum combined output of the Leakin Park and Ashburton Pumping Stations was 102.6 MGD on July 15, 1995 prior to the expansion of the Leakin Park Pumping Station and completion of the parallel Catonsville Water Transmission Main (2008 completion). The flows through the Ashburton and Leakin Park Pumping Stations on that day were approximately 59 MGD and 44 MGD, respectively.

Baltimore City supplies water through Baltimore County to Howard County through four (4) connections: the Gun Road connection, two Route 40 connections, and the ElkrIDGE connection. Howard County is billed on the basis of monthly meter readings and, in each case, the meter is located in Baltimore County near the boundary with Howard County.

The Gun Road connection was established by the August 14, 1934 Agreement between Baltimore City and Howard County (the 1934 Agreement). This agreement does not contain specific withdraw limitations although it has been assumed that an average daily flow of 1 MGD and a maximum daily flow of 1.7 MGD is allowable. The sources of supply are transmission mains from the Ashburton Pump Station. The connection originates in the Western Third Zone at Gun Road, crosses the Patapsco River, follows River Road to Lawyers Hill Road and, through the River Road pressure reducing valve, supplies the Howard County 400 pressure zone via Levering Avenue.

The Route 40 connection was originally established by the November 6, 1957 Agreement between Baltimore County, Baltimore City, and Howard County. By this agreement, Howard County was entitled to an average flow of 5.0 million gallons per day and a maximum of 8.5 million gallons per day from the Western Third Zone. A new Third Zone Agreement executed on July 9, 1986 lifted this flow restriction. Under the new agreement, Howard County may exceed its previously specified maximum daily withdraw rate as long as unused capacity is available in the Western Third Zone. The agreement provides for an ultimate maximum day capacity of 50.5 MGD for Howard County from the Western Third Zone.

Specific improvements to the water system in the Western Third Zone have been built in accordance with the 1986 Agreement. In 2007, the Leakin Park Pump Station was expanded and the parallel 48/42-inch diameter Catonsville Water Transmission Main (final completion in 2008) was completed to supply a maximum day demand of 50.5 MGD (48.8 MGD from the U.S. Route 40 connection and 1.7 MGD from the Gun Road connection) to Howard County. This capacity along with the capacity available from the County's other connections will satisfy Howard County's needs at build-out of the planned service area. Baltimore City does not, in general, cost-share in the new Western Third Zone improvements since these facilities will provide additional capacity for Howard and Baltimore Counties only. The City will, however, share in the cost of the following facilities:

1. Any local facilities within the City associated with construction of the Western Third Zone improvements.
2. Maintenance and rehabilitation of existing Western Third Zone facilities shared by the City.

Construction of the parallel Catonsville Water Transmission Main, Sections 1 through 4, was funded entirely by Howard County since the sole purpose was to provide increased capacity between the Leakin Park Pumping Station and the Howard County border.

Additional facilities, which are discussed later in this chapter and are also needed for Howard County to fully utilize the planned 50.5 MGD maximum day capacity from the Western Third Zone, will be constructed under separate agreements currently under negotiation.

New agreements currently being negotiated will also specify jurisdictional cost shares for each new facility. It is expected that a revised Central System Agreement will increase Howard County's average flow of 28.7 MGD (maximum daily flow = 50.5 MGD) from the Western Third Zone through the Route 40 and Gun Road connections.

The sources of the Western Third Zone supply to Howard County are transmission mains, including the Catonsville Transmission Main, from the Ashburton and Leakin Park Pump Stations to the Howard County line at the Patapsco River. The Route 40 connection draws from the Central System's Western Third Zone at U.S. Route 40 and the Patapsco River to supply the County's 550 pressure zone.

The Elkridge connection was established by the October 22, 1969 Agreement between Baltimore County, Anne Arundel County, Howard County, and Baltimore City (the Second Zone Agreement). The cost of constructing three subsections of the related transmission mains was apportioned by a January 30, 1980 amendment between Baltimore County, Anne Arundel County, Howard County, and Baltimore City (the Second Zone Amendment). Howard County is entitled to an average use of 8.8 million gallons per day and a peak hour demand of 17.6 million gallons per day through this connection. The connection originates in the Second Zone which receives treated water primarily from Lake Ashburton, which is supplied by the Ashburton Filtration Plant. The Second Zone also receives treated water from the Central System's First Zone via the Vernon Pump Station when the Ashburton Filtration Plant is unable to provide the complete needs of the Second Zone by itself. Similarly, the Hillen Road Pump Station also transfers water from the First Zone to the Second Zone. The Elkridge connection is supplied via the Southwest Transmission Main, crossing the Patapsco River and following River Road and Rockburn Branch to the Elkridge Pump Station, which supplies the County's 550 pressure zone.

WSSC

WSSC supplies water to Howard County through the All Saints Road connection. A meter located in Howard County provides the basis for monthly water use billing by WSSC. The connection was originally established by the October 25, 1954 Agreement between WSSC and Howard County (the 1954 Agreement). Howard County was entitled to a

maximum withdraw rate on any given day of 2.5 MGD under the 1954 Agreement, and is charged a volumetric rate equal to 70% of the prevailing retail rate charged to WSSC customers, based on a 240 gallons per day per household (gpd/household) usage rate .

WSSC agreed by letter dated December 24, 1986, on an interim basis, to allow Howard County a maximum daily withdraw rate of 3.5 MGD pending execution of a long-term agreement. This was followed by a long term agreement between Howard County and WSSC which was executed June 16, 1988. The 1988 Agreement replaced the 1954 agreement. It revises outdated provisions of the 1954 Agreement and provides for an increase in the allowable maximum daily flow through the All Saints Road connection to 5.0 MGD. As part of the new agreement, Howard County contributed towards the construction of a 12" water main along Montgomery Street in Laurel. This main will ensure that a 330 ft. hydraulic grade can be maintained at the suction side of the All Saints Road Pump Station under anticipated flow conditions. In addition, this main will provide a second suction main to the pump station which will guard against service interruption in the event of a main break.

Assuming that the ratio between maximum day and average day flow equals 1.7 for design purposes and a maximum day draw of 5.0 MGD, the allowable average day withdrawal equals 3 MGD. This amount of water will be available at normal system operating pressure except during unusual or emergency conditions. The agreement provides for additional capacity of up to 10 MGD, if requested by Howard County and approved by the WSSC.

With current reserved capacity of 5 MGD, the additional 5 MGD would not be reserved and used only when conditions in the WSSC distribution system permit. This is as a result of WSSC's desire to utilize excess capacity in its Patuxent Water Treatment Plant (currently rated at 56 MGD), and Howard County's desire to have additional useable sources to meet both existing and emergency needs. In the event an Agreement is put in place, Howard County will need to significantly upgrade the All Saints pumping station to increase the supply into the County's 400 Zone, the Whiskey Bottom and Rt. 32 pumping stations to

pump additional capacity into the 550 Zone, and interconnecting transmission mains for distribution.

The First Addendum to the 1988 Agreement was passed in 2008. Under the First Addendum, a six-month pilot program was conducted for Howard County to test the capacity of its equipment and facilities, and to determine what portion of its withdrawal allotment it could guarantee to utilize on a daily basis. A Second Addendum to the 1988 Agreement was passed in 2009. This Addendum establishes the billing rate and the withdrawal amounts between WSSC and Howard County. Under the Second Addendum, Howard County agrees to purchase a minimum of 2.5 MGD, regardless of the actual withdrawal rate, and at the same billing rate as charged by Baltimore City. The maximum daily withdrawal rate remains 5.0 MGD.

The raw water source for the WSSC supply is the T. Howard Duckett Reservoir on the Patuxent River. Water is treated at the Patuxent Water Filtration Plant, then conveyed east through a 24-inch main which branches to a 16-inch main with a 12 inch backup loop to the County's 400 pressure zone. The 16-inch main connects to the All Saints Road Pump Station which currently has a capacity of 5.0 MGD.

The WSSC water supply hydraulic gradient ranges from 10 to 30 feet below the 400 pressure zone hydraulic gradient which it serves, while the Baltimore water supply system gradient must be reduced through a pressure reducing valve before entering the 400 pressure zone. The 400 Zone is also supplied through pressure reducing valves from the 550 Zone which is in turn supplied from the Baltimore County water connections.

Future increases in demands in the 400 Zone and the 550 Zone will normally be supplied from the Baltimore City Central System. However, potential increases in available maximum day supply from WSSC would provide Howard County with the flexibility to supplement or partially replace supplies from the Baltimore Central System connections during emergencies and high demand periods. Provision of this flexibility is considered to be

in the best interests of Howard County since the County does not have direct control over its water supply sources.

Future Construction

The Baltimore City Central Water supply system and the Washington Suburban Sanitary Commission system have adequate transmission and supply capabilities to meet existing supply needs. However, in emergency or drought conditions, some user restrictions could be placed on Howard County by the suppliers.

The Baltimore Central System requires major new facilities to develop additional water supplies and to provide for the future water needs of Howard County. The facilities required within the Western Third Zone of the Central System are addressed in detail in the 2003 Baltimore Central System Report. Most of the facilities described in the Report have been constructed and placed in service.

The Central System Report states that the Western Third Zone presently has adequate storage and only 600,000 gallons of additional storage capacity will be necessary to meet year 2025 demands. The Zone currently has 37.4 MG of storage capacity located in three storage facilities (Catonsville Reservoir 1, Melvin Avenue Tank and the Pikesville Reservoir). Most of the storage is provided by Catonsville Reservoir 1, which was placed in service in 1995 and is located west of the intersection of U.S. Route 40 and Rolling Road in Catonsville. Catonsville Reservoir 1 was constructed as the first phase of a two-phase project with a capacity of 20 MG, of which approximately 10 MG of storage was allocated to Howard County. The second phase of the project was planned to provide an additional 32 MG of storage.

In lieu of constructing the proposed Catonsville Reservoir 2, the Central System Report suggested that the City consider taking advantage of the surplus supply capacity of the Ashburton and the Leakin Park Pumping Stations to satisfy future demand. When operating together, the capacity of the two stations exceeds the projected year 2025 maximum day demands of the Western Third Zone and dependent upper zones. The reliability of this suggestion was tested, however, in December 2010 when a pipe leak at the Leakin Park Pumping Station forced a shutdown of the station. City staff responded quickly to activate backup pumps at the Ashburton Pump Station to maintain water flow to the Catonsville Reservoir. The water supply to the Western Third Zone may have been significantly compromised if the station shutdown occurred under higher demand conditions.

Howard County anticipates entering into an inter-jurisdictional agreement with Baltimore City, Baltimore County, and Anne Arundel County which will address construction of the required central system improvements. This agreement will specify construction schedules and jurisdictional cost shares. In addition, it will specify water demands and flow limitations for each participating jurisdiction. The facilities which are anticipated to benefit Howard County are individually discussed below.

Fullerton Filtration Plant - The filtration plant will treat water from the Susquehanna River, and must accomplish softening and corrosivity reduction in addition to the normal filtration processes. The facility will have a minimum capacity of 66 MGD. However, computer simulations indicate a more balanced operation of the system when operating the Fullerton Filtration Plant at a maximum day rate of 101 MGD. Further, a maximum day capacity of 120 MGD will be needed if the Montebello Filtration Plant is partially taken out of service for an extended repair. A final determination of the size of the Fullerton Plant has not yet been made.

The Fullerton Filtration Plant will provide water directly to the eastern side of the First Zone, thus reducing the demands on the Montebello Filtration Plant in this area. This plant will also supply the Fullerton Second and Eastern Third Zone Pump Stations via the Fullerton Reservoir. Potable water supplied by the plant will eliminate the need of expansion of the Ashburton Filtration Plant since a portion of the required Second Zone supply will be pumped from the First Zone.

Deer Creek Pump Station, Pumps Addition - The Deer Creek Pump Station is/will be used to pump raw water from the Susquehanna River through the Susquehanna Transmission Main to both the Fullerton and Montebello Filtration Plants. The existing Deer Creek Pump Station has three 50 MGD pumps installed. With one pump in reserve, the station has a safe capacity of 100 MGD. There is space available for adding additional pumps to the Deer Creek Pump Station which will provide a safe capacity of 250 MGD.

Given below is a listing of the various Central System improvements required and the approximate time frames as given in the 2003 Central System Report and later reports.

<u>PROJECT</u>	<u>Projected Completion Date</u>
1. Fullerton Reservoir	2015
2. Addition of Two 50 MGD Pumps at Deer Creek Pump Station	2015
3. Fullerton Filtration Plant	2015

Groundwater Supply

Approximately 15 percent of the population of Howard County relies upon ground water for its water supply. Ground water is the major source of potable water where public water service is not available. Ground water from the crystalline rock formations will continue to be a major source of potable water in the western areas of Howard County, where new private individual wells will continue to be developed in the “No Planned Service” area. Howard County has no plans to allow the development of community wells.

Table 4 is an inventory of the existing well and surface water supplies in Howard County. The table was compiled from the list of active State Water Appropriation Permits that is maintained by the Maryland Department of the Environment.

Information about the ground water conditions in Howard County was obtained from the study “Water Resources of Howard County, Maryland” which was published by the Maryland Geological Survey in 1995, as Bulletin 38. That study was based on review of well records for over 2,000 wells, and chemical sampling and analysis of water from over 80 wells.

Bulletin 38 reported the State’s investigation of 2,354 crystalline-rock wells in Howard County. The reported well depths in their study ranged from 13 to 750 feet. In recent years it has become more common for residential and commercial crystalline-rock wells to be drilled deeper than 750 feet, in order to reach deeper water-bearing fractures and to increase the volume inside the well that can be used for water storage. The majority of these wells have a diameter of 6 inches. Some of the higher-yielding wells will have diameters of 8 inches.

Approximately 28.5 million gallons per day (MGD) of water was used in Howard County in 2010. Of this amount, 2.9 MGD was obtained from private ground water systems and from private surface water systems, and 25.6 MGD was delivered by two public water

systems. The public water systems are the Baltimore City system and the Washington Suburban Sanitary Commission system.

Howard County has parts of two physiographic provinces within its boundaries. The Coastal Plain, which occupies the extreme eastern part of the County (10%), has gravel, sand, silt and clay which were deposited in layers upon the eastward-dipping surface of the bedrock. The Piedmont province, which is present in the other 90% of the County, is characterized by an undulating surface with ridges and narrow stream valleys, underlain by crystalline rocks. The Fall Zone forms a boundary area between the Piedmont and Coastal Plain provinces. The Fall Zone trends in a northeast-southwest direction through Howard County, roughly parallel with I-95.

The geology of the County influences the ground water availability. Figure 15 is a generalized geologic map of Howard County which shows the geologic formations underlying the land surface. The Coastal Plain area in eastern Howard County is underlain by sediments of the Potomac Group. The remainder of the County is underlain by metamorphic and igneous rocks of the Piedmont. The Piedmont geology is complex, due to multiple episodes of folding, faulting, and intrusions by magma throughout geologic time.

In the Piedmont province, ground water is found in the joints and fractures of the igneous and metamorphic rocks. Higher-yielding wells tend to intersect a greater number of water-bearing fractures, and intersect more productive fractures. The layer of weathered rock and soil that rests on top of the bedrock is called saprolite. The saprolite functions as a reservoir that supplies water to the fractures in the bedrock.

Although the overwhelming majority of the wells in Howard County (98%) are in the Piedmont area, wells also exist which obtain water from the intergranular spaces of the sediments of the Coastal Plain. The Coastal Plain has unconsolidated layers of sediments belonging to the Cretaceous-age Patuxent Formation, and the Tertiary-Quaternary age terrace gravels, alluvium (stream deposits), and colluvium (slope deposits). In Howard County the

maximum thickness of the Coastal Plain deposits is about 140 feet. In some areas the water-bearing sands are confined beneath impermeable clays, while in other areas unconfined, or water-table conditions exist.

The fractured-rock aquifers are generally more susceptible to contamination than the Coastal Plain aquifers, because contaminants are absorbed to a greater degree on unconsolidated sediments than on bedrock fractures. The fractured-rock aquifers are also more susceptible in areas where the soil and saprolite are thin, and rapid recharge to the aquifer occurs.

In the Cockeysville Marble, the natural process of rock dissolution produces solution channels and other openings in the bedrock, such as sinkholes. The dissolution is caused by the movement of acidic ground water through the marble, and it can lead to relatively faster travel times for contaminants through the aquifer.

The natural quality of the ground water in Howard County is generally good, with the exception that the water is somewhat acidic in most areas. Some results of acidic water may include corroded plumbing, stained laundry, and an unpleasant taste. Acidic water may be addressed in residential water systems by addition of a substance to raise the pH of the water.

For wells completed in the Cockeysville Marble formation, the ground water may be naturally “hard” due to the presence of dissolved calcium and magnesium originating from the rock. Hard water may present difficulty in washing, or may cause mineral deposits in plumbing; it is typically addressed in residential supplies by a water softener system.

In Howard County, two naturally occurring radioactive elements in the ground water, radium and radon, have attracted attention. These elements emit a form of radiation known as alpha radiation. The U.S. Environmental Protection Agency (EPA) has indicated that some people who drink water containing alpha emitters in excess of EPA’s standard over many

years may have an increased risk of getting cancer. EPA's standards are not intended to regulate private wells, however they are provided here for reference.

The EPA has established a maximum contaminant level of 5 picoCuries per liter for combined radium 226/228 and 15 picocuries per liter for gross alpha emitters. Radium detections in Howard County are associated with wells completed in the Baltimore Gneiss geologic formation, which occupies a significant amount of central Howard County. The County Health Department has been collecting and analyzing water samples from wells within or close to the Baltimore Gneiss outcrop area. Of the 1,491 wells tested to date, the County indicates that the gross alpha concentration equaled or exceeded the EPA maximum contaminant level of 15 picoCuries per liter in 15% of the wells tested. Though early in the process, testing focused upon existing properties, current testing centers primarily upon newly created properties located with the Baltimore Gneiss formation. Testing protocols are in place to ensure a safe water supply (either through treatment or through verification of safe levels) at the time of occupancy. Those properties needing treatment to achieve safe drinking water levels are subject to "Treatment Agreements" that are filed with Howard County land records.

Radon has also been detected in samples from wells completed in the Baltimore Gneiss in Howard County. The EPA has proposed a water radon standard of 300 picoCuries per liter. In the above-referenced Maryland Geological Survey study of Howard County, the dissolved radon concentrations of ground water ranged from 800 to 40,000 picoCuries per liter, with a median of 3,400 picoCuries per liter. Radon in air is more dangerous than radon in water, and there are no plans at present for remediation.

A ground water balance indicates that adequate ground water resources are available in the Piedmont area of Howard County for the current uses. The average annual hydrologic budget for the Piedmont part of Howard County is as follows: precipitation (42 inches) equals evapotranspiration (28 inches) plus overland runoff (5 inches) plus ground water runoff (9 inches). Part of the ground water runoff is used for water supply. In this analysis,

the ground water part of the budget may be halved to 4.5 inches/year to conservatively represent drought conditions. (Palmer Drought Severity Index data maintained by the National Climatic Data Center indicates that “extreme” drought conditions occurred in central Maryland, in five different years during the 30-year period of 1976 to 2005.) The drought-year ground water recharge of 4.5 inches distributed over the 226-square mile Piedmont part of the County is equivalent to 48.4 MGD. The 1990 estimate of the combined private ground water and surface water withdrawals of 3.1 MGD represents 6 percent of the drought-year ground water recharge. This magnitude of ground water withdrawal is reasonable and sustainable.

The preceding ground water balance is regional, and site-specific characteristics such as the local geology, the extent of bedrock fractures, and localized ground water contamination will continue to influence how much ground water is available from a given property. The Howard County Health Department has indicated that several areas with ground water problems exist. Table 7 is an inventory of these problem areas.

Other Supply

Surface waters are not available for development by Howard County as public water supply sources since the larger streams have already been developed by others to a high degree. The major surface waters in Howard County include the Patuxent River, the Little and Middle Patuxent Rivers, Dorsey Run, Deep Run and the Patapsco River.

Planning by WSSC suggests utilization of the Patuxent River to its fullest extent. Existing reservoirs are required to discharge sufficient flow to maintain downstream aquatic life in accordance with reservoir discharge permits issued by the Department of Natural Resources. In addition, the Patuxent River is used for the assimilation of sewage effluent from the Maryland City Sewage Treatment Plant in Anne Arundel County.

The Middle and Little Patuxent Rivers and tributaries thereto are utilized to a small extent by several manufacturers and institutions in Howard County. Fort Meade also withdraws water from the Little Patuxent River downstream from the Howard County line. The Little-Middle Patuxent flows in Howard County are used for the assimilation of sewage effluent from the Little Patuxent Wastewater Treatment Plant which has a treatment capacity of 25.0 MGD. It is expected that the Little and Middle Patuxent Rivers and associated tributaries in Howard County will be developed to provide water for recreational purposes. The County has no plans to develop these sources as a potable water supply beyond the present limited industrial use. Three lakes have been constructed in Columbia, in the Little Patuxent Basin for recreational use. Although not designated for this purpose, these lakes also provide for stormwater management. Table 5 lists existing impounded potable water supplies in Howard County.

Dorsey Run is used to assimilate effluent from the State's sewage treatment plant in Jessup. Due to its small size, and use by the State, Dorsey Run does not offer the potential to supply any significant quantity of water for potable or industrial use in Howard County.

The Patapsco River is the only water course which has a potential for contributing to the public water supply in Howard County. However, several factors limit the safe yield of the river: (1) natural flow alteration by the Liberty Reservoir; (2) withdrawals by numerous industries, institutions, and towns enroute; and (3) deposition of sewage and waste by industries, institutions, and towns enroute.

Water System Modeling

The water system has been modeled considering present and future demands to the year 2035. This includes areas of known development and areas of infill development through the year 2035. Areas with inadequate hydraulic capacity were identified and alternative solutions tested. Additionally, water quality was modeled using water age

analysis and solutions to high water ages were identified and tested. Table 8, Priorities for Water System Development, was revised in accordance with these analyses. The modeling effort is described below.

The County is utilizing H2O Map, a fully calibrated hydraulic distribution system modeling software, for all water system modeling. This software is comprised of over 16,600 nodes and 18,000 pipes, ranging in size from 8 to 48 inches. This program can be utilized for regular (steady-state) and extended period simulations. The extended period simulations are useful in studying system response to demands over time, such as an entire day or multiple days. Fluctuations in water tank levels caused by variation in water demand over the day are considered. Extended period simulations are also useful in analyzing water age in tanks and nodes in the system over time, as an indication of water quality. Extended Period Simulations were performed using 24 hour periods or longer to ensure that system components are adequately sized to refill storage tank levels lowered during peak demands.

The County's GIS system was used to develop the initial water model, along with the diameter and length of transmission mains, the elevation of junctions, elevated water tank characteristics (capacity, maximum and minimum water levels), and the pump curves for each water pump station obtained from record drawings and other sources. A countywide base model with the pressure zones connected via pumping stations and pressure reducing valves (PRV) was developed to simulate the water transmission as close as possible to the real scenario. Calibration of the model was performed by conducting various fire flow tests within the system at various demand conditions, and results were analyzed to ensure a match with actual conditions. The system information was input for each water pressure zone and used as part of the model database, and a skeletonization program was used to consolidate redundant piping systems and eliminate insignificant pipes. Accordingly, the output report for each zone can be extracted and summarized individually for further analyses.

The County maintains a record of recent development and improvements to the water system using the County's GIS system. The piping network in the initial water model was

updated using the County's GIS system to represent the current Howard County water network.

The Department of Planning and Zoning provided geocoded population projections, which located projected populations and commercial/industrial acreage to be served by the public water system for the years 2010, 2015, 2020, 2025, 2030, and 2035. This population data was incorporated in the computer model data base using determined demand factors.

Demand factors (per capita use, etc.) used in the model are determined from existing Howard County Water and Sewer Allocation Reports and metered data. Individual factors were determined for Residential, Commercial, and Industrial flows and applied to the model using the Department of Planning and Zoning's projections. A factor of 15% to account for unaccountable and public use flow was also added according to Howard County design standards. To better model the daily flow pattern, a diurnal curve was developed based on flow data and applied to all demand nodes. For Year 2010, a peaking factor of 1.46 was used to determine maximum day use, based on hourly consumption rates observed between 2009 and 2010, as detailed in the July 2010 Water and Sewer Allocation report. For future time steps a peaking factor of 1.7 was assumed, following guidelines from the Howard County Design Manual.

Zones were also modeled with maximum day demands plus simultaneous fire demands. The fire demands were assumed to be located in the portion of each zone which has the lowest operating pressure for maximum day demand. Other locations were selected for fire flow simulations based on size of supply main, ground elevation, system looping, etc. This analysis identified areas lacking adequate water pressure to fight fires. For detached housing in residential areas, the water demand for fire-fighting was assumed to be 750 gallons per minute (GPM), while for commercial/industrial and multi-family housing areas, the water demand for fire-fighting was assumed to be 1,500 GPM as specified in the Howard County Design Manual. Areas with inadequate pressures were determined and corrective measures selected.

As an input to the H2O Map software for sizing pump stations, pump curves are utilized to allow analysis of system operating pressures. For future pumping stations, actual rating curves are not available. However, for modeling purposes, estimated pumping curves were selected from information provided by pump manufacturers. Estimated pump curves were used since they provide a more accurate simulation of pump station operation than do theoretical horsepower ratings. The actual curve of the pump station, when built, may be different from the estimated curve and will be determined at the actual time of pump station design.

The hydraulic water model was also used to analyze the predicted water age in the system, as an indicator of potential water quality problems. Water age was evaluated using extended period simulations, under average day demands, and was evaluated at system nodes and tanks.

The flow projections given in Tables 3, 3A, and 3B are for a twenty-five year planning period. This period is selected for analysis in the Master Plan since twenty-five year development and population projections are prepared by the Department of Planning and Zoning. The results of the hydraulic analysis served as a basis for identifying projects to be included in Table 8.

Table 6A lists public water storage tanks, both existing and proposed, which are part of the Howard County public system. Table 6B lists existing and proposed public system water pump stations. Table 8 provides a complete listing of proposed water facilities projects in the 0 to 5 year, 6 to 10 year, and Comprehensive Plan categories. The existing and proposed water facilities are shown on the attached series of Water Facilities Plan Maps.

It is noted that the pipe sizes given in Table 8 and on the Water Facilities Map (Exhibit 9) for proposed projects are for ultimate development since the design life of transmission mains exceeds 25 years. Ultimate flow projections are based on existing

development patterns and densities and on the allocated capacity of undeveloped land as provided by the Department of Planning and Zoning. It is often advantageous from an engineering or economic perspective to initially size and construct conveyance facilities based on the ultimate development potential of the area served. In determining whether or not a facility should be initially constructed to meet twenty-five year (build-out demands), the following must be addressed in an engineering analysis of the proposed project:

1. Present worth analysis, comparing the cost of phased implementation (construction of parallel mains, incremental pump station expansion, etc.) with the cost of a facility initially providing capacity for ultimate development.
2. System hydraulics, considering such factors as differences in pump or pipe sizes required for twenty-five year and ultimate flows, head losses, retention time, etc.
3. System reliability, considering the advisability of having parallel facilities to provide for limited flow capacity during maintenance or repair periods.
4. Construction limitations, considering the difficulties involved with constructing parallel facilities after initial construction is complete.
5. System design life, considering the useful life of the facility.

Required Local System Improvements

A) 300 Zone

Analysis of the 300 water pressure zone (lower Elkridge and vicinity) shows that no further expansion will be required during the length of the planning period (2035).

B) 350 Zone

The analysis of the 350 water pressure zone (Ellicott City and immediate surroundings) showed that no further system expansion will be required through the year 2035.

C) 400 Zone

The 400-pressure zone has recently undergone some upgrades to its system of PRVs and pump stations connecting it to the 550 Zone. Whiskey Bottom pump station was converted from a pumping station containing 2 pumps, to one containing a PRV and standby pump. The PRV supplies water from the southern portion of the 550 zone into the 400 zone and is currently in operation. The existing pump remains in service in standby and has the ability to supply water from the 400 Zone to the 550 Zone, if needed.

A new 2.0 MG Guilford Tank (W8262) is planned for the 400 Zone. The existing ground level Guilford Tank, currently out of service, will be converted to a reclaimed water tank (see Chapter 4). The new elevated tank is currently in the planning process, and was evaluated for inclusion in the Year 2015 time step of the model. The new tank will be used in conjunction with the existing GBFM tank (0.75 MG) to provide storage capacity and redundancy for the 400 Zone in the future. With the addition of the new Guilford Tank, PRV controls will need to be updated to coordinate with levels in the new tank.

There are several areas in the 400-pressure zone that have experienced low pressures (below 40 psi) due to their relatively high elevations. Low pressures were observed near the Whiskey Bottom Pump Station (and PRV) and Gorman Road PRV. Piping improvements alone were not found to provide adequate relief; instead pressures in these areas could be increased by elevating the output

pressure of the PRVs or by expanding the 550 Zone in these areas. High velocities (above 6 ft/s) were observed at the north end of the 400 zone from the Patapsco State Park supply to Levering Avenue. By Year 2015, a new section of 12-inch and 16-inch water main (approx. 6,600 lf) from Edgewood Road in the Patapsco State Park in Baltimore County to Levering Avenue in Howard County to US Route 1 will increase the reliability of the water supply to the 400 Zone and decrease velocities in the supply line (W8300). This project is currently under design.

Several additional improvements were identified in the 400-pressure zone to serve new areas of development, or to provide additional system looping. These improvements are as follows:

1. By Year 2015, the replacement of approximately 9,000 linear feet of 16-inch water main in Meadowridge Road between Route 1 and Route 100 (W8249).
2. By Year 2015, the installation of approximately 5,500 linear feet of 12-inch water main along Dorsey Run Road (W8292).
3. For Year 2020, the installation of approximately 3,000 linear feet of 8-inch and 12-inch water main along Loudon Avenue and the railroad (W8303).

D) 550 Zone

An analysis of the 550-water pressure zone identified problems throughout the zone in meeting future demands if no further system improvements are made. These problems include areas of inadequate pressures, high pipe velocities, and low tank levels.

A series of improvements are recommended in the 550 Zone to increase the north to south flow of water in the zone. The addition of these projects alleviates a majority of the problems in the 550 Zone. Phasing of these improvements is as follows:

1. The installation of an 18,000 linear feet of 36-inch water main along Route 29 between Route 108 and Broken Land Parkway to parallel existing mains is recommended (W8296). Construction of this water main is currently in progress.
2. The installation of 3,100 linear feet of 12-inch water main along Kindler Road is recommended (W8297) and is currently in progress
3. For Year 2015, the installation of a 5,800 linear feet of 12-inch water main along Sanner Road is recommended (W8306). The installation of this improvement was also evaluated in the potential connection of the 630 West and 630 South pressure zones, detailed later in the report.
4. For Year 2015, the installation of a 4,100 linear feet of 30-inch water main along Broken Land Parkway from Steven Forest Road to Cradlerock Way is recommended (W8307).
5. For Year 2015, the installation of 14,000 linear feet of 24-inch water main to parallel existing water mains along Route 29 from Route 32 to Route 216 is recommended (W8308). Out of the recommended Year 2015 improvements, this improvement has the greatest effect on maintaining levels in the Scaggsville Tank.

As an alternative to some of the recommended piping improvements, it was observed using the model that additional water may be available to southern portions of the 550 Zone by adjusting operations of the Whiskey Bottom pumping

station and PRV. Currently the Whiskey Bottom PRV is in use; while the pumping station is under standby. The Whiskey Bottom pumping station could be used to provide flow to the 550 Zone from the 400 Zone, especially after the construction of the new Guilford Tank providing additional storage to the 400 Zone.

Even with the recommended improvements installed, according to the model there are several areas in the 550-pressure zone that have low pressures (below 40 psi) due to their relatively high elevations. Low pressures were observed near the Scaggsville Tank and Route 216 Pumping Station. Pressures in these areas could be increased by shifting the 550/630W pressure zone boundary or by elevating the output pressure of the PRV's.

The zone analysis also showed that the existing water storage capacity provided in the Snowden River and Scaggsville tanks will be sufficient to meet the zone's demands beyond 2035.

E) 560 Zone

The analysis indicates that no further expansion of the 560 zone (Hollifield area) will be required during the planning period (2035).

F) 630 East Zone

An analysis of the 630 East Zone showed the existing distribution system and storage available to be adequate through year 2035. This Zone is supplied from the 550 Zone with water pumped through the Edgar Road and Montgomery Road pump stations. The stations are capable of supplying average day demands to the

zone. The existing storage at the Oakland Ridge and Jonestown tanks was shown to be adequate through 2035.

Low pressures and available fire flows were observed in the eastern portion of the 630 East zone off of Illchester Road. The area in question is served by a single 8-inch water main along Illchester Road, which serves as a bottleneck. In Year 2015, it is recommended that service to the area either be increased to a 12-inch line or new piping be added to provide an additional connection to the area. By making these improvements, pressures and available fire flow issues would be resolved.

G) 630 West Zone

Growth projections for the 630 West water pressure zone indicate that main extensions, storage, and pumping facilities will be needed to service new development. In order to provide adequate water pressure to areas west of Turf Valley Road during peak demand periods, a 20-inch main has been constructed along US Rte 40 beginning from Dogwood Lane to Bethany Lane where it connects with the 630 West Zone distribution system. This main serves as the suction and discharge main for the Pine Orchard pumping station. The station capacity is presently 3.7 MGD, improvements to the pumping station which will increase pumping capacity to 5.2 MGD are currently in the design stage.

Hydraulic analysis showed that the Harpers Choice Tank cycles regularly through year 2035. Improvements to the Columbia Pumping Station are not shown to be needed.

Storage capacity in the zone is currently deficient according to Howard County design criteria. The criteria for storage of 20% maximum day demand plus fire reserve will not be met. A new Marriottsville tank, located off Marriottsville

Road across from Warwick Way, will have a capacity of 1.25 MG (W8263, currently under design). Two (2) water main extensions to the new tank site have been constructed; a 16" suction line and 12" discharge line. An extension of an existing 16-inch water main across portions of the Turf Valley Golf Course has recently been constructed, which will serve as a suction main supply enhancement for the new tank. In addition, a Developer Project will provide a 16 inch water main across portions of the Waverly Woods golf course north of Interstate 70.

The feasibility of an interconnection between the 630 West and 630 South pressure zones along Sanner Road (W8306) was evaluated using the hydraulic model. By connecting the two zones, additional storage capacity is available and redundant supply sources are available for both pressure zones. This is especially of interest for the 630 West pressure zone, where Howard County General Hospital is located.

The hydraulic model showed that in order for this interconnection to work effectively, additional water mains will need to be added in the southern portion of the 550 Zone to provide adequate supply to the Scaggsville Tank and the Rt. 216 and Maple Lawn pumping stations (W8308). Modeling also showed that additional improvements to the 630 South Zone would need to be completed if the pumps in this zone are to be considered a redundancy to the Columbia Pumping Station and Harpers Choice Tank in the 630 West Zone. Due to the distance between pump stations in the 630 South zone and the Harper's Choice Tank, existing 630 South Zone pump stations would run continuously and be unable to supply water above the minimum pressure level or supply water for fire flow to the 630 West Zone. Without significant improvements to the 630 South pumping stations, this interconnection between the 630 West and 630 South pressures zones should only be considered as a temporary/emergency connection.

H) 630 South Zone

Analysis shows that the new Fulton Tank and associated pump stations will be able to supply appropriate pressures and fire flow through full build-out of this zone in 2035. New development projects will continue in the 630 South Zone through Year 2020, including approximately 28,000 ft of 12" water distribution main to complete looping. The zone analysis also showed that the water storage capacity provided by the Fulton Tank will be sufficient to meet the zone's demands beyond 2035.

Plans ultimately include linking the 630 South and 630 West zones hydraulically to provide additional storage to the 630 West zone. Modeling shows that both daily demands and fire flow are able to be met in the 630 South Zone through 2035 if the zones are connected. If the supply from the 630 South Zone to the Harper Choice Tank is to be a backup for the Columbia Pumping Station, improvements to the 630 South Zone pumping stations are needed.

I) 730 Zone

Due to increased residential sprinkling requirements for town homes in the Waverly Woods subdivision (part of the 630 West Zone), an additional area from Marriottsville Road to Dorchester Way was converted from the 630 West to the 730 Zone. This increased demand to the 730 Zone water system will require additional pumping capacity at the Frederick Road water pumping station. Capital Project W8264 has been established to upgrade the pumping capacity of the Frederick Road WPS from 0.58 MGD to 1.6 MGD. As part of the new 630 West Marriottsville EWT, a pumping station is being designed in the tank base to provide 3.2 MGD to the 730 Zone under peak flow conditions as a backup. Construction of the tank and pumping station are projected to be completed by

the Year 2015 development period. The hydraulic modeling showed that the tank and pumping station are needed to adequately serve Year 2010 demands.

The zone analysis showed an area of reduced pressure (below 40 psi) along Mountain View Road due to their relatively high elevations; however it still adequately meets County standards. Analysis shows that after the addition of Marriottsville Tank and pump station in the 630 West Zone (by Year 2015) the Alpha Ridge Tank and associated pump stations will be able to supply appropriate pressures and fire flow through full build-out in 2035.

Water Quality Modeling

The H2O Map hydraulic water model was used to model water age throughout the Howard County system. Water age analysis is often used as an indication of water quality, as long system retention times can lead to the deterioration of quality. Problems associated with longer system retention times include the formation of disinfection byproducts, decay of disinfectants, and poor color, taste and odor. The American Water Works Research Foundation (AWWARF) recommends water age under 2.5 days in system tanks, which equates to an approximately 40% turnover rate per day. However, water age may not accurately predict poor water quality in every water system. In addition to modeling, Howard County has commissioned several rounds of biological testing and sampling to test system wide water quality.

Modeling analyses were conducted through Year 2035 using Average Day Demand Extended Period Simulations to test water age at demand nodes and tanks. All required local system improvements were included in the appropriate modeling years. It was assumed that water age at the system supply points is zero (0) days; however, Howard County receives all of its system water supply from surrounding areas. Therefore, actual water age entering the

system may be greater than estimated. Water age results by zone from the hydraulic model are as follows:

A) 350 Zone

Analysis of water age in the 300 water pressure zone shows that water age ranges from 2 days to 6 days except for nodes at the end of lines which experience greater water age due to the lack of circulation. Water age does not greatly differ between time steps in the model. This zone does not contain a water storage tank, therefore; water age is dictated mainly by the PRVs that supply this area.

B) 400 Zone

According to modeling results, water age is lowest at both supply points in the northern and southern ends of the zone. As the demand in the zone increases through build out in 2035, water age in both the Guilford Tank (future) and Food Market Tank decreases and daily tank cycling increases. Therefore, the majority of estimated water age decreases in the 400 Zone to between 3 to 6 days. However, both tanks still appear to have ages greater than 2.5 days.

The greatest impact to water age in the 400 Zone occurs when the Zone's two tanks are cycled more deeply. Therefore, deeper tank cycling should be considered to improve water age by adjusting PRV settings. Also, The County is in talks with WSSC to increase water supply in the southern portion of the 400 Zone. If this happens water age in the 400 Zone, especially towards the southern end, should decrease.

C) 550 Zone

Modeling results indicate that water age towards the northern portion of the zone, at the US 40 Supply, remains under 2 days through 2035. In general, water

age along the major water mains running the length of Route 29 remains between 2 and 6 days. Water age increases towards the edges of the 550 Zone away from the central supply line. In the area of Scaggsville Tank at the southern end of the 550 Zone, water age is greater than 6 days. Water age in this area is decreased significantly after the inclusion of recommended improvements to the water mains along Route 29, as north-south water flow is enhanced.

Increase in age in the Snowden River and Scaggsville Tanks remains linear until demands cause enhanced tank cycling in year 2035. Therefore, deeper Tank cycling should be considered as a solution to high water age in these Tanks.

D) 630 East Zone

Modeling efforts show that the majority of water age in this zone ranges between 3 to 6 days through full build out (2035). Water age at nodes does not greatly differ between timesteps. Both Jonestown EWT and Oakland Ridge EWT have water ages greater than 2.5 days. As demand in the Zone increase through year 2035, water age in these Tanks decreases due to greater tank cycling. Therefore, deeper Tank cycling should be considered to improve water age by adjusting PRV settings.

E) 630 West Zone

Analysis of water age in the 630 West Zone indicates that water age is greatest in the western portions of the zone. In the northern portion of the zone, modeling results show that water age is over 10 days towards the border of the 730 Zone. The addition of Marriottsville Tank by Year 2015 and the addition of east-west piping increases water supply to this area and decreases water age. Both Marriottsville and Bethany Tanks have water ages higher than 2.5 days. The greatest impact to water age in this section is when cycling in these two tanks

increases. Therefore, deeper tank cycling should be considered after the installation of Marriottsville Tank.

In the southwest section of the 630 West Zone, analysis shows that the majority of water age is above 2.5 days. Modeling results show that the addition of piping along Guilford Road to increase system looping and water movement does not significantly impact water age. The greatest decrease in water age occurs in modeling Year 2035. This is due to a large enough increase in water demand to cause greater cycling in Cedar Tank and water movement. Therefore, the greatest impact to water age in this section is when cycling in Cedar Tank increases.

F) 630 South Zone

Modeling shows that water age in the 630 South Zone and in the Fulton Tank is greater than 10 days. Results indicate that additional pipe looping within the zone does not significantly impact water age. Currently, the 630 South Zone is supplied water by two pump stations that pull from the southern portion of the 550 Zone. Therefore, water age in this zone depends on water age in the southern portion of the 550 Zone which is greater than 6 days. Improvements in the 550 Zone cause a slight reduction in water age in the 630 South Zone but water age still remains above 2.5 days through year 2035.

G) 730 Zone

Initial modeling results for Year 2010 show that water age in this zone is greater than 2.5 days throughout, with the oldest water occurring in the western most portion of the zone. The addition of Marriottsville Tank and pump station by Year 2015 in the 630 West Zone to supply the 730 Zone slightly decreases

water age. However, modeling shows that water age in the Zone is greater than 10 days through full build out Year 2035.

Overall modeling results indicate that water age in the majority of the existing system is greater than 2.5 days. Water age is lowest at the US 40 supply towards the North end of the system and along the north-south water mains running the length of Route 29; age in these areas runs from 0 to 3 days. The zones that experience the longest system retention times are the 630 South Zone and the 730 Zone. While water age decreases in these sections through Year 2035, the model shows that it remains above 10 days in nodes and tanks. Additional pipe looping to increase the movement of water was tested but modeling shows it does not significantly impact water age in the system. The greatest decrease in overall system water age occurs with increased tank cycling. Therefore, deeper tank cycling should be considered to improve water age by adjusting PRV and pump station settings, while making sure to preserve adequate equalization and fire flow storage. It is very important to note that to date, the County has not experienced or reported any water quality problems.

Water Sampling Results

The modeling showed high water age in many areas of the Howard County system, specifically in the 730 and 630 South pressure zones. High water age *can* be an indicator of water quality problems, but sampling is needed to confirm problems.

Howard County started a water testing program in 2008 to test for disinfection by-products (DBPs) and high chlorine residuals. Sampling was completed at multiple test locations throughout the system in areas that experienced longer retention times. The sampling efforts have shown acceptable levels of DBPs and chlorine residuals in these areas. Howard County maintains a regular sampling program and has not reported any problems to date. A summary of the sampling results are included as Exhibit 3.

Financing Water Improvements

The Department of Public Works assumed the function and duties of the Howard County Metropolitan Commission when the Charter form of government was established. Under the Charter and existing local public laws, the following charges are authorized to finance the construction, operation, maintenance and administration of water facilities:

- a) Ad Valorem Assessment
- b) Front Foot Benefit Assessment
- c) Water House Connection Fees
- d) Water User Charges
- e) In-Aid-of-Construction Charges

Ad Valorem Assessment - A yearly levy of .08 cents per \$100 of assessed property value is made against all properties within the Metropolitan District. The assessment is a source of revenue designated to cover the cost of retiring bonds issued by the County and can be used to cover the payment of salaries and other expenses of the Department of Public Works related to the water and sewerage systems.

Front Foot Benefit Assessment - The front foot benefit assessment is levied against all properties provided with water service and the revenue is used for bond debt service. The current residential front foot assessment rate for fiscal year FY 12 is \$ 0.81 per foot for the first 150 feet, \$ 0.61 per foot for the second 150 feet, and \$ 0.30 per foot for all frontage over 300 feet. The commercial front foot assessment rate for water service is \$ 1.01 per foot of total frontage. Front Foot Benefit Assessment fees are no longer collected to recover costs for capital projects after FY2005.

Fixed frontages are as follows: 25 feet per unit for apartments, 45 feet per unit for mobile homes, and 12.5 feet per unit for motels.

Water House Connection Fees – After June 30, 2007, connections to the public water system are performed, under contract with the property owner, by Howard County licensed on-site utility contractors. The County charges a \$300 inspection and administration fee and holds a 10% retainer based on the estimated construction cost. Under special circumstances as approved by the Director of Public Works, a one-time charge may be used for connections to the public water system. This charge covers the construction of the connection from the water main in the public right-of-way to the abutting property line of the property served. Under these special circumstances, an individual homeowner is charged \$2400 for a 1 ½ - inch connection with a 1-inch meter. Connections larger than 1 ½ inches will continue to be performed by the Advanced Deposit Order (ADO) process.

Water Service Charges – Water to the user is metered and paid under the prevailing schedule of charges. The rate consists of a two part charge; one being a volumetric charge based on a winter / summer usage differential, the other being a quarterly account user charge based on meter size. The current charges are as follows:

A) Quarterly Account User Charges (as of June 30, 2011)

<u>Meter Size</u>	<u>Charge</u>
5/8"-1"	\$ 11.26
1 ½"-3"	\$ 36.33
4"- up	\$ 184.71

B) Volumetric Rates

Winter rate - \$1.49 / 100 cubic ft.

Summer rate - \$1.66 / 100 cubic ft.

Water In-Aid-of-Construction Charge

This fee is applicable to all users of the water system and is a source of revenue designated to cover the cost to Howard County of construction or purchase of public water facilities, which serve or will serve all properties connected to the system, whether or not these facilities are located in the County. The fee structure has been modified for Fiscal Year 2012, and is now a one-time charge based on the size of the water meter, with additional fees collected if a change in meter change size is required. The current fee structure is as follows:

<u>Size of Water Meter</u>	<u>IACC Fee</u>
5/8 – 1”	\$600
1 ½”	\$4,800
2”	\$7,680
3”	\$16,800
4”	\$28,800
6”	\$64,800
8”	\$230,400
10”	\$336,000
12”	\$422,400

The above charges, fees, and assessments are reviewed and readopted annually by the County Council with appropriate changes.

In addition to property owners as a source of construction revenue, the County has the following sources of funds:

- 1) Developer Agreements
- 2) Interest Income

Developer Agreements - A Developer Agreement is the method of financing the construction of water distribution mains in a new subdivision. The developer advances the total construction cost of the mains including engineering and administrative expenses. The

developer may recover his construction cost through the price of the lots or by creation of a private water company (under Maryland State law) to bill the cost through the users.

Interest Income - proceeds from bonds and revenues earmarked for construction are invested and earn interest until they are needed. Due to the irregularity of disbursements /and receipts, the annual interest income varies considerably.

CHAPTER 3

TABLES AND FIGURES

TABLE 3

**PROJECTED WATER SUPPLY DEMANDS AND PLANNED CAPACITY
HOWARD COUNTY PUBLIC WATER SYSTEM**

	Household Population				Baltimore City			WSSC	
Year	Total	Unserved	Served	Average Daily Use (mgd) (2)	Gun Road	US Rt 40 (3)	Elkridge	All Saints (4)	Total supply
2009 ¹	276,770	38,812	237,958	----	1.0	28.7	8.8	3.0	41.5
2010	279,973	39,369	240,604	25.6	1.0	28.7	8.8	3.0	41.5
2015	295,679	41,414	254,265	27.1	1.0	28.7	8.8	3.0	41.5
2020	309,885	43,448	266,437	28.6	1.0	28.7	8.8	3.0	41.5
2025	319,510	45,371	274,139	29.6	1.0	28.7	8.8	3.0	41.5
2030	326,791	47,710	279,081	30.1	1.0	28.7	8.8	3.0	41.5
2035	331,365	49,523	281,842	30.3	1.0	28.7	8.8	3.0	41.5

Notes:

- (1) Unit demand flows developed for 2010 were not applied to previous years. Population and acreage shown are 7C values for 2010.
 (2) Average Day use including residential, commercial/industrial, public, and unaccountable use
 (3) Supply established by July 1986 Agreement.
 (4) By 1988 Agreement, 3.0 ADF, 5.0 MDF

TABLE 3A

AVERAGE DAILY WATER DEMAND

	2009 ¹	2010	2015	2020	2025	2030	2035
Residential Use							
Population Served	237,977	240,604	254,265	266,437	274,139	279,081	281,842
Average Daily Demand (mgd)	----	16.1	17.0	17.9	18.4	18.7	18.9
Commercial Use							
Acreage served	4,258	4,285	4,578	4,866	5,077	5,124	5,124
Average Daily Use(2)	----	4.5	4.8	5.1	5.3	5.3	5.3
Industrial Use							
Acreage served	3,408	3,424	3,612	3,962	4,260	4,422	4,422
Average Daily Use(3)	----	1.7	1.8	1.9	2.1	2.1	2.1
Public Use (4)							
	----	1.1	1.2	1.2	1.3	1.3	1.3
Unaccountable Use (5)							
	----	2.2	2.4	2.5	2.6	2.6	2.6
TOTAL							
	----	25.6	27.1	28.6	29.6	30.1	30.3

(1) Unit demand flows developed for 2010 were not applied to previous years. Population and acreage shown are 7C values for 2010.

(2) Based on 2010 estimated unit demand values (Commercial - 1039 gpd/acre)

(3) Based on 2010 estimated unit demand values (Industrial - 485 gpd/acre)

(4) Calculated at 5%, based on Howard County Design Standards 15% for public and unaccountable (10%) water use

(5) Unaccountable use calculated at 10% (8.9% from 2009 Water Audit)

TABLE 3B

**PROJECTED AVERAGE DAILY DEMAND
AND CONTRACTED AVERAGE DAILY DEMAND**

Connection	Agreement	Current Contracted Supply	Projected Demand (MGD) ²						
		(MGD)	2009 ¹	2010	2015	2020	2025	2030	2035
Baltimore City									
Gun Road	1934 Agreement	1.0	1.0	0.03	0.4	1.4	1.5	1.6	1.6
U.S. Rt 40	Third Zone Agreement	28.7	12.8	19.2	20.4	21.2	22.0	22.4	22.6
Elkridge	Second Zone Agreement	8.8	6.5	4.1	3.3	3.1	3.2	3.8	3.8
WSSC									
All Saints	1988 Agreement	3.0	1.7	1.4	2.2	2.8	3.0	3.0	3.0
TOTAL		41.5	22.0	24.8	26.3	28.5	29.7	30.8	31.0

Notes:

(1) From Water and Sewer Allocation Report, July 2009

(2) For Years 2010 through 2035, projected demands are based on average day supply rates as determined by the hydraulic model.

TABLE 4

INVENTORY OF EXISTING MULTI-USE COMMUNITY WELL AND SURFACE WATER SUPPLY

Water Appropriation Permit Number and Revision	Owner	Effective Year	Aquifer	Remarks	Average Limit (gal./day)	Maximum Month Limit (gal./day)	North Coordinate	East Coordinate
HO1950G001(07)	WILLIAMS TRANSCO PIPELINE	2006	LOWER PELITIC SCHIST WISSAHICKON	COMPRESSOR STATION 190 - ELLICOT CITY	500	1,000	522	820
HO1952G002(05)	JHU APPLIED PHYSICS LAB	2001	WISSAHICKON FORMATION	IRRIGATION	1,000	5,000	486	830
HO1955G001(07)	W. R. GRACE & CO.	2006	LOWER PELITIC SCHIST WISSAHICKON	WASHINGTON RESEARCH CENTER	70,000	140,000	495	827
HO1958G001(05)	KONTERA LIMITED PARTNERSHIP	2005	PATUXENT FORMATION	LAUREL SAND & GRAVEL PLANT	500	1,000	496	881
HO1958G006(04)	MANGIONE ENTERPRISES OF TURF VALLEY	1993	COCKEYSVILLE MARBLE	TURF VALLEY GOLF COURSE	2,000	5,000	533	832
HO1961G004(04)	BOARMAN, FLORENTINE J.	1998	BALTIMORE GNEISS	BOARMAN'S MARKET	500	600	490	811
HO1962G005(05)	MARYLAND STATE HIGHWAY ADMIN	2007	LOWER PELITIC SCHIST WISSAHICKON	SHA GARAGE AT DAYTON	1,600	2,700	516	806
HO1963G001(05)	HOWARD COUNTY FAIR ASSOCIATION, INC.	2007	BOULDER GNEISS WISSAHICKON FORM.	COUNTY FAIRGROUNDS	1,000	25,000	538	807
HO1963G004(02)	WESTMINSTER UNION BANK	2002	WISSAHICKON FORMATION	BANK	200	300	552	781
HO1963G006(04)	CONVENTUAL FRANCISCAN FRIARS	2001	LOWER PELITIC SCHIST WISSAHICKON	FRANCISCAN FRIAR RESIDENCE	1,500	2,300	518	817
HO1963G008(06)	SISTERS OF BON SECOURS USA	2010	SWIFT RUN FORMATION	RETREAT HOUSE & CONVENT	17,000	22,000	545	830
HO1965G003(02)	RONO RURAL ENTERPRISES, INC.	2002	LOWER PELITIC SCHIST WISSAHICKON	DRIVING RANGE	500	20,000	475	826
HO1965G011(02)	ROWAN PROPERTIES, LLC	2002	WISSAHICKON FORMATION	POOL & LANDSCAPE OFFICE	300	500	550	773
HO1966G006(04)	MT. AIRY HOWARD CHAPEL CHURCH, ,	1998	IJAMSVILLE FORM.-MARBURG SCHIST		100	500	540	755
HO1966G012(02)	SEVENTH DAY ADVENTISTS	2002	LOWER PELITIC SCHIST WISSAHICKON	SANITARY USE ONLY ON PUBLIC SEWER	400	600	494	837
HO1967G001(05)	HOWARD COUNTY PUBLIC SCHOOLS	2005	BOULDER GNEISS WISSAHICKON FORM.	GLENWOOD M. S.	5,000	7,000	532	792
HO1967G006(04)	CROOKS, AMY, R.	2002	WISSAHICKON FORMATION	COUNTRY KETTLE RESTAURANT	1,000	1,200	551	770
HO1967G007(05)	NIXON'S FARM, INC.,	2002	LOWER PELITIC SCHIST WISSAHICKON	NIXON'S FARM - SPECIAL EVENTS	250	1,000	532	811
HO1967G008(02)	WARFIELD, KENNARD J.	2002	LOWER PELITIC SCHIST WISSAHICKON	OLD TYME LIQUORS	100	200	521	804
HO1967G010(04)	NERI, LUIGI, AND ANNA	1998	PATUXENT FORMATION	ANNAPOLIS JUNCTION POST OFFICE	500	600	472	858
HO1968G001(04)	BROWN'S CHAPEL, UNITED METHODIST	2001	LOWER PELITIC SCHIST WISSAHICKON	BROWNS CHAPEL, UMC	100	200	512	802
HO1969G002(05)	AGGREGATE INDUSTRIES, ,	2010	PATUXENT FORMATION	MANUFACTURE CINDER BLOCKS	700	900	471	859
HO1971G006(02)	EXXON MOBIL CORPORATION	2001	BALTIMORE GNEISS	EXXON STATION NO 27459	500	800	500	816
HO1971G009(02)	CISSEL PROPERTIES,	2002	WISSAHICKON FORMATION	LISBON TECH CENTER	200	300	547	780
HO1972G002(04)	DAYTON ROD AND GUN CLUB INC.	2004	LOWER PELITIC SCHIST WISSAHICKON	CLUB -	100	200	509	801
HO1973G003(04)	HOWARD COUNTY PUBLIC SCHOOLS	2003	BOULDER GNEISS WISSAHICKON FORM.	GLENELG H. S.	7,100	10,300	525	799
HO1973G004(05)	HOWARD COUNTY PUBLIC SCHOOLS	2005	WISSAHICKON FORMATION	LISBON E. S.	2,500	3,000	547	780
HO1973G006(04)	HOWARD COUNTY PUBLIC SCHOOLS	2005	LOWER PELITIC SCHIST WISSAHICKON	WEST FRIENDSHIP E. S.	1,500	2,000	535	815
HO1973G011(04)	FAITH COMMUNITY CHURCH	2005	IJAMSVILLE FORM.-MARBURG SCHIST		300	500	549	758
HO1974G001(03)	LIBERTY BAPTIST CHURCH	2002	WISSAHICKON FORMATION	CHURCH	100	300	548	780
HO1974G002(04)	FERGUSON, SR, JAMES, R.	2006	WISSAHICKON FORMATION	SAND & GRAVEL HAULING	250	500	543	791
HO1974G003(04)	UNIVERSITY OF MARYLAND	2006	LOWER PELITIC SCHIST WISSAHICKON	RESEARCH, EXTENSION, AND EDUCATION	10,000	16,000	516	820
HO1974G019(05)	GARY MEMORIAL UNITED METHODIST	2002	LOWER PELITIC SCHIST WISSAHICKON		100	300	540	853
HO1975G003(04)	THE ROMAN CATHOLIC ARCHBISHOP	2003	METAGABBRO AND AMPHIBOLITE	CHURCH HALL	800	1,000	548	770
HO1975G009(05)	GLENELG COUNTRY SCHOOL	2008	SETTERS FORMATION	SCHOOL POTABLE, COOLING, IRRIGATION	8,000	12,000	517	811
HO1976G001(03)	HOWARD CO DEPT RECREATION	1998	LOWER PELITIC SCHIST WISSAHICKON	CENTENNIAL PARK	1,000	2,500	513	839
HO1976G007(03)	HOWARD COUNTY DPW	2001	BOULDER GNEISS WISSAHICKON FORM.	COOKSVILLE HIGHWAY MAINTENANCE	1,000	1,500	541	798
HO1977G005(03)	O'DONNELL AND COMPANY	2002	ULTRAMAFIC ROCKS	JOHN S. WILSON COMPANY	400	600	538	812
HO1978G003(03)	THE ARC OF HOWARD COUNTY	2002	BALTIMORE GNEISS	NON PROFIT SPECIAL NEEDS CENTER	500	700	514	823
HO1978G005(03)	INTERMEDIA COMMUNICATIONS INC.	2002	WISSAHICKON FORMATION	TOWER AND MAINT FACILITY UNMANNED	100	100	541	792
HO1979G005(05)	MOUNT AIRY BIBLE CHURCH	2005	WISSAHICKON FORMATION	CHURCH & SCHOOL	2,000	4,000	552	772
HO1980G001(03)	VINCI, AGOSTINO, JOSEPH	2001	COCKEYSVILLE MARBLE	VINCI STONE PRODUCTS, INC.	300	500	551	828
HO1980G003(03)	WARD, RYAN, G	2005	WISSAHICKON FORMATION	IRRIGATION OF NURSERY STOCK	2,300	9,200	545	785
HO1980S001(01)	VINCI, AGOSTINO, J.	2002	SOUTH BRANCH	DUST CONTROLL STONE QUARRY	4,000	7,500	551	828
HO1981G003(03)	LISBON UNITED METHODIST CHURCH	2001	WISSAHICKON FORMATION	CHURCH/DAY CARE	500	800	546	781
HO1981G004(03)	ARMSTRONG, WILLIAM	2004	LOWER PELITIC SCHIST WISSAHICKON	GWHP	3,000	6,000	504	800
HO1981G005(02)	BROWN, GEORGE AND JUDITH	1999	IJAMSVILLE FORM.-MARBURG SCHIST	CHANGE OF ADDRESS	4,500	7,500	554	764
HO1981G006(03)	GLYNN, JAMES C.	2004	BALTIMORE GNEISS	SMALL BUSINESS OFFICE	100	200	490	812
HO1981G007(03)	EYRE, RONALD L.	2003	LOWER PELITIC SCHIST WISSAHICKON	EYRE BUS SERVICE	2,000	2,500	521	803
HO1981S005(04)	TRANSCONTINENTAL GAS PIPELINE	2003	MIDDLE PATUXENT RIVER	HYDROSTATIC PRESSURE TEST	18,000	3,100,000	522	829
HO1982G003(02)	LANEVE, RONALD, S.	1998	SETTERS FORMATION	CEASAR'S III RESTAURANT	2,000	2,600	533	820

TABLE 4

INVENTORY OF EXISTING MULTI-USE COMMUNITY WELL AND SURFACE WATER SUPPLY

Water Appropriation Permit Number and Revision	Owner	Effective Year	Aquifer	Remarks	Average Limit (gal./day)	Maximum Month Limit (gal./day)	North Coordinate	East Coordinate
HO1982G004(04)	HOWARD COUNTY DPW	2005	LOWER PELITIC SCHIST WISSAHICKON	DAYTON HIGHWAY MAINTENANCE SHOP	800	1,000	516	806
HO1983G001(03)	WEST HOWARD COUNTY SWIM CLUB	1993	WISSAHICKON FORMATION	SWIMMING POOL	500	2,000	552	779
HO1983G004(04)	CALVARY LUTHERAN CHURCH	2006	WISSAHICKON FORMATION	CHURCH-CALVARY LUTHERAN	1,000	1,700	551	777
HO1983G006(03)	IGENE BIOTECHNOLOGY	2005	LOWER PELITIC SCHIST WISSAHICKON		250	500	509	852
HO1983G008(04)	HO CO PUBLIC SCHOOLS	2007	BOULDER GNEISS WISSAHICKON FORM.	BUSHY PARK ELEMENTARY SCHOOL	3,500	5,000	534	739
HO1984G001(03)	SHEPHERD OF THE GLEN LUTHERAN	2006	BOULDER GNEISS WISSAHICKON FORM.	CHURCH	200	500	527	794
HO1984G002(03)	COMMUNITY BIBLE CHURCH HIGHLAND	2006	BALTIMORE GNEISS		250	600	492	813
HO1984G009(02)	HO CO DEPARTMENT OF RECREATION	1996	BOULDER GNEISS WISSAHICKON FORM.	LAND PRESERVATION FUND	200	300	542	811
HO1984G013(04)	FESTERLING, JOACHIM,	2006	BOULDER GNEISS WISSAHICKON FORM.	LINDENHOF NURSERY	800	3,500	538	803
HO1985G001(02)	HOWARD COUNTY RECREATION	1997	GUNPOWDER GRANITE	SCHOOLEY MILL PARK	600	2,400	486	811
HO1986G009(02)	GROUP 5 PARTNERSHIP,	2002	LOWER PELITIC SCHIST WISSAHICKON	PATRICK CLARK & ASSOC. INSURANCE	100	200	480	822
HO1986G012(02)	LISBON VOLUNTEER FIRE CO	1998	WISSAHICKON FORMATION	FIRE COMPANY	200	1,000	547	778
HO1986G013(03)	HARIG	2007	LOWER PELITIC SCHIST WISSAHICKON	OFFICES, NEW RESTAURANT, GYM	1,850	3,500	522	803
HO1987G003(02)	MIKOLASKO, ERIC, J.	1999	IJAMSVILLE FORM.-MARBURG SCHIST	WASHINGTONIAN LANDSCAPE CO.	600	2,400	542	761
HO1987G005(05)	LISBON PLAZA, LLC	2003	WISSAHICKON FORMATION	LISBON SHOPPING CENTER WELL	10,000	14,500	552	781
HO1987G007(03)	CREST LAWN MEMORIAL GARDENS, INC.	2001	WISSAHICKON FORMATION	CEMETERY OFFICE	800	1,200	538	819
HO1987G009(02)	WALKER, STEPHEN T.	1999	BOULDER GNEISS WISSAHICKON FORM.	TRUSTED INFORMATION SYSTEMS, INC.	1,400	2,000	529	792
HO1987G010(02)	CRANE, DONALD E.,	1999	ULTRAMAFIC ROCKS	CHANGE OF ADDRESS	3,000	5,000	519	802
HO1987G012(02)	WALLY'S IRON WORKS, INC.	1999	IJAMSVILLE FORM.-MARBURG SCHIST	ORNAMENTAL FABRICATION SHOP	200	300	553	764
HO1987G015(02)	CAMPBELL, DONALD & KAREN	1999	LOWER PELITIC SCHIST WISSAHICKON	GROUND WATER HEAT PUMP	2,000	4,000	531	812
HO1988G003(02)	WILLOW SPRINGS I LIMITED PARTNER	2001	BOULDER GNEISS WISSAHICKON FORM.	GOLF COURSE IRRIGATION - 3 WELLS	20,000	125,000	540	809
HO1988G007(08)	SUNOCO, INC., ,	2009	BALTO. GABBRO COMPLEX	STATION # 0003-4587	1,000	3,000	526	846
HO1988G103(01)	WILLOW SPRINGS I LIMITED PARTNER	2001	BOULDER GNEISS WISSAHICKON FORM.	WILLOW SPRINGS CLUB HOUSE	1,000	2,000	540	809
HO1988S001(02)	SNELL, DAVID R.,	1999	UNNAMED TRIBUTARY	SNELL'S NURSERY	1,300	5,200	550	749
HO1988S003(02)	WILLOW SPRINGS I LIMITED PARTNERSHIP	2001	UNNAMED TRIB	GOLF COURSE IRRIGATION, SPRING PONDS	15,000	200,000	540	809
HO1988S017(03)	COLUMBIA ASSOCIATION, INC.	2007	MIDDLE PATUXENT RIVER	HOBBIT'S GLEN GOLF CLUB	52,000	350,000	507	827
HO1989G003(02)	THOMPSON, CARL A. & SANDY, A.	2001	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL GWHP - RECHARGE WELL	3,000	6,000	507	797
HO1989G007(02)	MANFUSO, KATHARINE VOSS & ROBERT	2001	BOULDER GNEISS WISSAHICKON FORM.	CHANCELAND HORSE FARM	1,400	2,000	540	802
HO1989G016(06)	TARO INVESTMENT CORPORATION	2006	COCKEYSVILLE MARBLE	BRICK HOUSE FARM BOTTLED WATER	116,000	152,000	512	817
HO1989G017(02)	FRIENDSHIP BAPTIST CH OF SYKESVILLE	2002	BOULDER GNEISS WISSAHICKON FORM.	CHURCH.	300	500	546	814
HO1989S006(02)	TURNER, DANIEL, C.	2001	PATUXENT RIVER	NURSERY STOCK IRRIGATION	100	500	489	805
HO1989S014(02)	SHARP, CHARLES	2001	CATTAIL CREEK	FARM IRRIGATION 280 ACRES	152,000	1,000,000	524	784
HO1990G002(02)	HEALEY, DAVID AND MARIANNE	2002	EARLY PALEOZOIC-LATE PC UNDIF.	GREENHOUSE AND CONTAINER NURSERY	3,000	12,000	544	799
HO1990G013(04)	WARFIELD, JR, KENNARD,	2002	BOULDER GNEISS WISSAHICKON FORM.	WARFIELD-43 LOT SBDN	9,200	15,300	514	795
HO1990G014(04)	WARFIELD, JR., KENNARD,	2002	BOULDER GNEISS WISSAHICKON FORM.	12-LOT SBDN	2,600	4,300	516	797
HO1990G016(02)	CATTAIL CREEK COUNTRY CLUB, INC.	2001	BOULDER GNEISS WISSAHICKON FORM.	CATTAIL CREEK GOLF COURSE	42,000	300,000	525	787
HO1990G017(03)	HOWARD COUNTY GOVERNMENT	2008	BALTO. GABBRO COMPLEX	TIMBERS AT TROY GOLF COURSE	71,000	260,000	498	867
HO1990G019(02)	ROLLINS, RICHARD	2003	PATUXENT FORMATION	HANOVER AUTO BODY	300	500	495	879
HO1990S003(02)	J. LANDON REEVE	2002	CATTAIL CREEK	IRRIGATION AT LANDSCAPE COMPANY.	4,500	18,000	528	776
HO1990S016(02)	CATTAIL CREEK COUNTRY CLUB, INC.	2001	EAST BRANCH	CATTAIL CREEK GC - MAIN POND	43,000	288,000	524	787
HO1990S017(03)	HOWARD COUNTY GOVERNMENT	2008	DEEP CREEK	TIMBERS AT TROY GOLF COURSE	3,600	7,300	498	867
HO1991G016(03)	ERIK ROSENBAUM	2010	WISSAHICKON FORMATION	POTABLE & SANITARY USES, NURSERY	16,000	60,000	542	791
HO1991S004(02)	CHAPEL VALLEY LANDSCAPE COMPANY	2004	CATTAIL CREEK	NURSERY STOCK IRRIGATION	3,500	5,000	527	775
HO1991S016(03)	ERIK ROSENBAUM	2010	CATTAIL CREEK	NURSERY IRRIGATION RUNOFF POND	5,000	15,000	542	791
HO1991S116(03)	ERIK ROSENBAUM	2010	CATTAIL CREEK	NURSERY STOCK IRRIGATION - SPRING	5,000	15,000	542	791
HO1992G002(02)	WARREN H. BOYER, INC., ,	2004	BOULDER GNEISS WISSAHICKON FORM.	WELL THAT FEEDS POND	2,000	7,000	530	793
HO1992G003(05)	HOWARD COUNTY DPW	2007	BALTO. GABBRO COMPLEX	COUNTY HIGHWAY MAINTENANCE FACILITY	7,200	9,000	495	863
HO1992G008(02)	MCKENDREE ASSOCIATES LLC,	2004	BOULDER GNEISS WISSAHICKON FORM.	GREENHOUSE & FIELD IRRIGATION	7,000	9,000	538	799
HO1992G009(02)	STEDDING, WILLIAM, M.	2004	BOULDER GNEISS WISSAHICKON FORM.	GREEN MANOR TURF FARM	34,000	100,000	545	813
HO1992G015(02)	MANGIONE ENTERPRISES OF TURF VALLEY	2000	COCKEYSVILLE MARBLE	TURF VALLEY GOLF COURSE	113,000	311,000	534	833
HO1992G202(01)	WARREN H. BOYER, INC.	2004	BOULDER GNEISS WISSAHICKON FORM.	WELL FOR SHOP AND OFFICE	100	1,000	530	793

TABLE 4

INVENTORY OF EXISTING MULTI-USE COMMUNITY WELL AND SURFACE WATER SUPPLY

Water Appropriation Permit Number and Revision	Owner	Effective Year	Aquifer	Remarks	Average Limit (gal./day)	Maximum Month Limit (gal./day)	North Coordinate	East Coordinate
HO1992S002(02)	WARREN H. BOYER, INC.	2004	LITTLE CATTAIL CREEK	NURSERY STOCK IRRIGATION	2,000	20,000	530	793
HO1992S004(03)	LARRILAND FARM	2004	CATTAIL BRANCH	IRRIGATION	30,000	1,400,000	538	770
HO1992S006(02)	10010 GORMAN ROAD, LLC	2010	MIDDLE PATUXENT RIVER	IRRIGATION	43,000	92,000	478	842
HO1992S008(02)	MCKENDREE ASSOCIATES,	2004	UNNAMED TRIB	GREENHOUSE & FIELD IRRIGATION	4,000	30,000	538	799
HO1992S009(02)	STEDDING, WILLIAM, M.	2004	SOUTH BRANCH	GREEN MANOR TURF FARM	31,000	465,000	545	813
HO1992S010(02)	COLUMBIA ASSOCIATION, INC.	2005	LITTLE PATUXENT RIVER	FAIRWAY HILLS GOLF COURSE	45,000	250,000	511	843
HO1992S011(02)	DELPH, JOHN L.	2005	SOUTH BRANCH	LIVESTOCK WATERING	300	500	556	765
HO1992S102(02)	WARREN H. BOYER, INC.,	2004	LITTLE CATTAIL CREEK	IRRIGATION FROM LARGE POND OUT BACK	34,000	300,000	530	793
HO1992S202(01)	WARREN H. BOYER INC.	2004	CATTAIL CREEK	NURSERY IRRIGATION, STREAM POND	1,500	15,000	530	793
HO1993G002(02)	RONALD BAIRE	2006	LOWER PELITIC SCHIST WISSAHICKON	NURSERY STOCK IRRIGATION	700	2,500	503	810
HO1993G004(02)	VALLEY BROOK COMMUNITY CHURCH	2002	BALTIMORE GNEISS	CHURCH & SCHOOL	700	1,000	489	816
HO1993G005(02)	WEST FRIENDSHIP CENTER LLC	2005	LOWER PELITIC SCHIST WISSAHICKON	HIGH'S STORE OF WEST FRIENDSHIP	200	400	536	813
HO1993G007(03)	ADVENTURE NURSERY	2005	WISSAHICKON FORMATION	NURSERY IRRIGATION	15,400	23,100	542	791
HO1993G018(02)	MT. ZION UNITED METHODIST CHURCH	2003	BALTIMORE GNEISS	MT. ZION UNITED METHODIST CHURCH	3,600	7,000	486	816
HO1993S002(02)	LEA BAIRE	2006	MIDDLE PATUXENT RIVER	NURSERY STOCK IRRIGATION	3,800	9,000	511	815
HO1993S008(04)	MANGIONE ENTERPRISES OF TURF VALLEY	2000	LITTLE PATUXENT RIVER	GOLF COURSE IRRIGATION - CHANGE	40,000	580,000	533	831
HO1993S014(01)	KRATZ, CHARLES, E.	1993	MIDDLE PATUXENT RIVER	SHRUBS AND GRASSES IRRIGATION	1,200	3,000	528	808
HO1994G003(02)	WAVERLY WOODS GOLF CLUB, L.L.C.	2006	BALTIMORE GNEISS	WAVERLY WOODS IRRIGATION WELL(S)	14,000	72,000	538	831
HO1994G009(02)	DOWD, TIMOTHY,	2007	WISSAHICKON FORMATION	TENNIS CLUB	3,000	9,000	539	785
HO1994S003(02)	WAVERLY WOODS GOLF CLUB, L.L.C.	2006	DAVIS BRANCH	IRRIGATION POND	60,000	450,000	538	831
HO1995G005(03)	J.R. ENTERPRISES, LLP	2010	BOULDER GNEISS WISSAHICKON FORM.	INWOOD VILLAGE SHOPPING CENTER	5,000	7,500	535	794
HO1995G006(01)	TREE CENTER, INC.	1995	WISSAHICKON FORMATION	LABOR CAMP KIMBERTHY TREE, TURF FARM	100	400	546	782
HO1995G009(02)	ROMAN CATHOLIC ARCHBISHOP	2007	LOWER PELITIC SCHIST WISSAHICKON	CHURCH	1,300	2,200	478	826
HO1995G020(02)	MANNARELLI, SR., MARIO, F.	2001	BOULDER GNEISS WISSAHICKON FORM.	33-LOT SBDN	7,000	11,700	523	786
HO1996G011(02)	TARO INVESTMENT CORPORATION	2008	COCKEYSVILLE MARBLE	TARO INVESTMENT CORPORATION	500	800	512	817
HO1997G001(02)	HOWARD COUNTY DPW	2009	BALTIMORE GNEISS	HOWARD COUNTY ALPHA RIDGE LANDFILL	252,000	288,000	538	824
HO1997G004(02)	HOWARD COUNTY DPW	2010	WISSAHICKON FORMATION	CARRS MILL LANDFILL	90,000	144,000	541	785
HO1997G013(03)	SAPLING RIDGE LLC	1999	BOULDER GNEISS WISSAHICKON FORM.	107 LOT SBDN	22,900	38,200	513	795
HO1997G014(03)	GENERAL ELECTRIC COMPANY	2009	BALTO. GABBRO COMPLEX	GROUND WATER REMEDIATION	8,000	10,000	490	852
HO1997G021(03)	THE VILLAS AT CATTAIL CREEK, LLC	2007	SYKESVILLE FORMATION	VILLA AT CATTAIL CREEK	14,000	19,600	526	788
HO1997G024(01)	STATE HIGHWAY ADMIN	1997	LOWER PELITIC SCHIST WISSAHICKON	STATE HIGHWAY SHOP	700	1,000	516	806
HO1997G026(02)	RUSSELL DEVELOPMENT, L.L.C.	2000	BALTIMORE GNEISS	GAITHER OVERLOOK - 74 LOTS	15,700	26,200	514	830
HO1998G002(02)	HOWARD CO BUR ENVIRONMENTAL	2010	BALTO. GABBRO COMPLEX	HO CO DPW NEW CUT LF REMEDIATION	94,000	144,000	516	857
HO1998G003(02)	BRANTLY DEVELOPMENT GROUP, INC.	1999	LOWER PELITIC SCHIST WISSAHICKON	BRANTWOOD 122-LOT SUBD.	25,900	43,200	528	828
HO1998G005(01)	JOHN FRANK, DEPUTY FIRE CHIEF	1998	BOULDER GNEISS WISSAHICKON FORM.	FIRE & RESCUE TRAINING	500	12,000	541	798
HO1998G009(01)	GLENWOOD BAPTIST CHURCH	1998	BOULDER GNEISS WISSAHICKON FORM.	GLENWOOD BAPTIST CHURCH	100	300	521	787
HO1998G010(02)	LYNNGATE PROPERTIES, LLC	2010	LOWER PELITIC SCHIST WISSAHICKON	TERMINAL TIRES, INC.	300	500	522	803
HO1998G011(01)	HOODS MILL CORPORATION	1999	BOULDER GNEISS WISSAHICKON FORM.	51 LOT SBDN	10,800	18,100	544	797
HO1998G013(03)	HOWARD COUNTY DPW	2010	BOULDER GNEISS WISSAHICKON FORM.	WELL FOR GLENWOOD FIRE STATION	3,400	6,400	536	791
HO1999G001(01)	CHAU MINH DO, ,	1999	WISSAHICKON FORMATION	IRRIGATION-GROW SPROUTS	200	500	552	777
HO1999G003(01)	MANYARA, SYMON, M.	1999	BALTIMORE GNEISS	RESIDENCE	2,000	3,000	533	824
HO1999G006(01)	HAILEY DEVELOPMENT, L.C.	1999	BOULDER GNEISS WISSAHICKON FORM.	30 WELLS	6,600	11,000	526	803
HO1999G013(01)	NICHOLS, MARSHALL, W.	1999	WISSAHICKON FORMATION		6,600	11,000	532	773
HO1999G014(02)	ST. ANDREWS EPISCOPAL CH	2000	BOULDER GNEISS WISSAHICKON FORM.	ST ANDREWS EPISCOPAL CHURCH	500	1,500	532	792
HO1999G015(01)	C.C.O. LLC, ,	1999	BOULDER GNEISS WISSAHICKON FORM.	SINGLE FAMILY SUBDIVISION	3,000	5,000	524	791
HO1999G017(01)	UNITED STATES POSTAL SERVICE	1999	BALTIMORE GNEISS	UNITED STATES POST OFFICE - HIGHLAND	100	300	491	811
HO1999G018(01)	CUBBAGE, LLC, ,	1999	BOULDER GNEISS WISSAHICKON FORM.	RESIDENTIAL SUBDIVISION	5,600	9,300	522	794
HO1999S004(01)	RLO CONTRACTORS INC., ,	1999	CHESAPEAKE BAY		500	40,000	510	803
HO1999S009(01)	COLUMBIA PARK & RECREATION ASSOC	1999	UNNAMED TRIBUTARY	PARK & RECREATION	800	2,000	504	842
HO1999S011(01)	HOWARD COUNTY DEPT. RECREATION	1999	UNNAMED TRIB	PARK OPERATIONS	500	2,200	513	839
HO2000G001(01)	SCRIVNER, J., THOMAS	2000	BOULDER GNEISS WISSAHICKON FORM.	SINGLE FAMILY SUBDIVISION	5,300	8,900	521	795

TABLE 4

INVENTORY OF EXISTING MULTI-USE COMMUNITY WELL AND SURFACE WATER SUPPLY

Water Appropriation Permit Number and Revision	Owner	Effective Year	Aquifer	Remarks	Average Limit (gal./day)	Maximum Month Limit (gal./day)	North Coordinate	East Coordinate
HO2000G002(02)	EDDY'S WELDING	2000	COCKEYSVILLE MARBLE	EDDY'S WELDING	1,000	1,500	540	853
HO2000G003(01)	VERTEX, INC.	2000	BOULDER GNEISS WISSAHICKON FORM.	RESTRICTED SUBDIVISION	2,800	4,600	529	801
HO2000G004(01)	BIG BRANCH, LLC	2000	BOULDER GNEISS WISSAHICKON FORM.	HOMEBUILDER TOLL BROTHERS	100	200	514	798
HO2000G006(01)	REUWER, JR., DONALD, R.	2000	BOULDER GNEISS WISSAHICKON FORM.	FARM	7,800	177,500	520	782
HO2000G007(01)	GRODIN, MICHAEL, A.	2000	BOULDER GNEISS WISSAHICKON FORM.	MICHAEL A. GRODIN	800	3,000	528	780
HO2000G008(01)	BUCH, JR., JAMES, R.	2000	LOWER PELITIC SCHIST WISSAHICKON	BUCH CONSTRUCTION CONTRACTOR	300	500	479	828
HO2000G011(01)	FLOYD LANE, LLC	2001	LOWER PELITIC SCHIST WISSAHICKON	48 LOTS BUCKSKIN RIDGE	9,999	16,700	518	807
HO2000G012(01)	MOUNT VIEW, LLC	2000	LOWER PELITIC SCHIST WISSAHICKON	47 LOT PINDELL WOODS SBDN	10,000	17,000	484	824
HO2000G013(01)	SDC GROUP, INC.	2000	BOULDER GNEISS WISSAHICKON FORM.	SDC GROUP, INC.	5,100	8,500	528	786
HO2000S005(01)	DEMASTUS, GLENN	2000	CATTAIL CREEK	VEGET. GARDEN & POOL	400	2,500	549	780
HO2000S010(01)	FOREST RECYCLING PROJECT INC.	2000	UNNAMED TRIB	FOREST RECYCLING PROJECT	7,000	20,000	511	813
HO2000S014(01)	CATTAIL CREEK COUNTRY CLUB, INC.	2001	LITTLE CATTAIL CREEK	CATTAIL CREEK GC - SWM POND	15,000	288,000	525	786
HO2001G001(02)	IAQUINTA, LOU	2001	LOWER PELITIC SCHIST WISSAHICKON	34-L FOX CREEK SUBD	7,300	12,100	534	818
HO2001G004(02)	3881 TEN OAKS MANAGEMENT, LLC,	2005	LOWER PELITIC SCHIST WISSAHICKON	COMERCIAL & RETAIL CENTER	2,500	3,800	522	804
HO2001G005(01)	NORTHRIDGE DEVELOPMENT, LLC	2001	METAGRAYWACKE WISSAHICKON FORM.	NORTHRIDGE DEVELOPMENT	3,400	5,700	530	803
HO2001G006(01)	SANBORN, JAMES, M.	2001	BALTIMORE GNEISS	KOANDAH GARDENS ESTATE	2,800	4,700	492	812
HO2001G007(02)	HOWARD COUNTY PUBLIC SCHOOLS	2009	LOWER PELITIC SCHIST WISSAHICKON	FOLLY QUARTER MIDDLE SCHOOL	5,000	8,000	522	805
HO2001G009(01)	GLENWOOD, LLC	2001	WISSAHICKON FORMATION	GLENWOOD, LLC	3,000	4,000	535	794
HO2001G011(01)	HAILEY DEVELOPMENT	2001	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL SUBDIVISION	2,600	4,500	531	812
HO2002G001(01)	MCCANN, ELIZABETH	2002	WISSAHICKON FORMATION	17 LOT SBDN	3,700	6,100	546	793
HO2002G002(01)	HARRISON, CLIFTON AND BETTY	2002	ULTRAMAFIC ROCKS	TWIN PINES	2,800	4,700	528	809
HO2002G003(01)	OWINGS, HARWOOD AND ALMA GAYE	2002	BALTIMORE GNEISS	OWINGS LOT #3	2,400	3,900	491	809
HO2002G004(01)	CHANYASULKIT, JOHN & ANNA	2002	IJAMSVILLE FORM.-MARBURG SCHIST	CHLAYASLILKIT	2,000	3,000	550	748
HO2002G005(01)	GST TRUST & SISTER'S TRUST	2002	WISSAHICKON FORMATION	RESIDENTIAL	9,600	16,000	528	798
HO2002G007(01)	THOMPSON, DALE	2002	BALTIMORE GNEISS	HOME BUILDER/DEVELOPER	1,700	2,900	491	813
HO2002G008(01)	DAR AL-TAQWA, INC.	2002	BALTIMORE GNEISS	RELIGIOUS FACILITY	500	800	511	832
HO2002G009(02)	PULTE HOME CORPORATION	2004	ULTRAMAFIC ROCKS	PADDOCKS EAST 22 LOTS	4,700	7,800	525	806
HO2002G010(01)	RIDGE VIEW, LLC	2002	WISSAHICKON FORMATION	RIDGE VIEW LLC	3,900	6,400	546	757
HO2002G011(01)	TEMPLE ISAIAH	2002	BALTIMORE GNEISS	TEMPLE ISAIAH	3,000	7,000	485	818
HO2002G012(01)	WOODMONT ACADEMY, INC.	2002	BOULDER GNEISS WISSAHICKON FORM.	WOODMONT ACADEMY	8,300	11,000	541	799
HO2002G013(01)	CHASE MINING, LLC.	2003	BALTO. GABBRO COMPLEX	CHASE MINING	280,000	698,000	482	855
HO2002G014(01)	BUICE, MR. ROBERT	2002	BOULDER GNEISS WISSAHICKON FORM.	MR. ROBERT BUICE	2,800	4,700	517	786
HO2002G015(02)	ST. JAMES UNITED METHODIST	2005	LOWER PELITIC SCHIST WISSAHICKON	CHURCH AND DAY SCHOOL	800	1,200	541	816
HO2002G016(01)	SEWELL, ARNOLD	2002	BOULDER GNEISS WISSAHICKON FORM.	RESIDENTIAL SUBDIVISION	3,900	6,400	542	810
HO2002G017(01)	IGLEHART, ET. AL., MILTON	2002	BALTIMORE GNEISS	RESIDENTIAL SUBDIVISION	3,000	5,000	492	820
HO2002S006(01)	EASTER, JIM	2002	UNNAMED TRIB	PRIVATE RESIDENCE	200	300	492	814
HO2002S113(01)	CHASE MINING, LLC.	2003		CHASE MINING	120,000	4,100,000	482	855
HO2003G001(01)	CASTLEBERRY AT TEN OAKS, LLC	2003	LOWER PELITIC SCHIST WISSAHICKON	CASTLEBERRY AT TEN OAKS, LLC	9,800	16,300	518	803
HO2003G002(01)	CALVARY LUTHERAN CHURCH	2003	WISSAHICKON FORMATION	CHURCH	300	500	552	780
HO2003G003(01)	TOLL BROTHERS, INC.	2003	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL SUBDIVISION	5,100	8,500	486	821
HO2003G004(01)	SMITH, TOM	2003	BOULDER GNEISS WISSAHICKON FORM.	GREENHOUSE	800	2,500	536	802
HO2003G005(01)	PRESERVE AT WAVERLY GLEN, LLC	2003	BALTIMORE GNEISS	PRESERVE AT WAVERLY GLEN, LLC	5,100	8,500	542	832
HO2003G006(02)	TOLL MD II LIMITED PARTNERSHIP,	2004	LOWER PELITIC SCHIST WISSAHICKON	90 LOT SBDN	19,100	31,900	510	825
HO2003G007(01)	RADUE, PETER	2003	IJAMSVILLE FORM.-MARBURG SCHIST	DAMASCUS EQUINE ASSOCIATES	300	500	542	757
HO2003G008(01)	RAPFALIDES, MARIA	2003	LOWER PELITIC SCHIST WISSAHICKON	W. FRIENDSHIP SHOPPING CENTER	4,300	6,100	535	813
HO2003G010(01)	GLYNN, JAMES & CAROLE	2003	BALTIMORE GNEISS	CONSIGNMENT SHOP	100	200	491	812
HO2003G011(01)	TRINITY QUALITY HOMES, INC.	2003	WISSAHICKON FORMATION	RESIDENTIAL-TRINITY QUALITY HOMES	4,500	7,500	543	776
HO2003G012(01)	HOWARD COUNTY CONSERVANCY	2003	BALTIMORE GNEISS	HOWARD COUNTY CONSERVANCY, INC.	600	1,200	540	833
HO2003G015(02)	HOWARD COUNTY PUBLIC SCHOOLS	2004	METAGRAYWACKE WISSAHICKON FORM.	WESTERN ELEM SCHOOL - TEN OAKS RD	2,100	7,700	513	804
HO2003G016(01)	DORSEY MILL, LLC	2003	BOULDER GNEISS WISSAHICKON FORM.	RESIDENTIAL	5,500	9,200	520	795
HO2004G001(01)	GOOD HOPE REFORMED PRESBYTERIAN	2004	BALTIMORE GNEISS		300	400	483	818

TABLE 4

INVENTORY OF EXISTING MULTI-USE COMMUNITY WELL AND SURFACE WATER SUPPLY

Water Appropriation Permit Number and Revision	Owner	Effective Year	Aquifer	Remarks	Average Limit (gal./day)	Maximum Month Limit (gal./day)	North Coordinate	East Coordinate
HO2004G002(01)	ST. PAUL'S EPISCOPAL CHURCH	2004	WISSAHICKON FORMATION	EPISCOPAL CHURCH	100	200	552	774
HO2004G003(01)	BORNEMANN, DVM, VALERIE	2004	WISSAHICKON FORMATION	GLENELG ANIMAL HOSPITAL	600	700	542	793
HO2004G005(01)	TOLL BROTHERS, INC.	2004	BOULDER GNEISS WISSAHICKON FORM.	27 RESIDENTIAL SINGLE FAMILY	5,800	9,700	519	795
HO2004G007(03)	HOMEWOOD LLC	2007	LOWER PELITIC SCHIST WISSAHICKON	HOMEWOOD, LLC - ADDING ONE LOT	17,200	28,300	516	825
HO2004G008(01)	MACBETH FARM, LLC	2004	BALTIMORE GNEISS	RESIDENTIAL REAL ESTATE DEVEL	7,700	13,000	495	816
HO2004G010(01)	HOWARD COUNTY DPW	2005	WISSAHICKON FORMATION	GLENWOOD COMMUNITY CENTER	2,400	4,800	536	791
HO2004G011(01)	TRIADELPHIA FARM, LLC	2004	BOULDER GNEISS WISSAHICKON FORM.	SUBDIVISION	6,000	11,400	522	790
HO2004G013(02)	LIME KILN VALLEY, LLC	2006	LOWER PELITIC SCHIST WISSAHICKON	SUBDIVISION	7,800	13,000	480	810
HO2004G014(01)	MMGMB, LLC	2004	BOULDER GNEISS WISSAHICKON FORM.	GENERAL OFFICE BUILDING	1,400	2,000	531	790
HO2005G002(01)	MUSGROVE FARM, LLC	2005	BOULDER GNEISS WISSAHICKON FORM.	RESIDENTIAL SUBDIVISION	6,600	11,130	524	798
HO2005G005(01)	HIGHLAND CROSSING, LLC	2005	BALTIMORE GNEISS	HIGHLAND CROSSING, LLC	2,000	2,500	490	812
HO2005G006(01)	HERITAGE LAND DEVELOPMENT	2006	COCKEYSVILLE MARBLE	WALNUT GROVE	19,200	32,100	508	817
HO2005G007(02)	WILLIAMSBURG GROUP L.L.C.	2006	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL SUBDIV	4,300	7,000	512	816
HO2005G009(01)	SHALEHEARTH, L.C.	2006	BALTIMORE GNEISS	SADLEBROOK FARM 13-LOT SBDN	2,800	4,700	542	835
HO2006G001(02)	RUTAN, ROBERT	2008	LOWER PELITIC SCHIST WISSAHICKON	PRIVATE RESIDENCE DEWATERING	8,500	20,000	510	836
HO2006G002(01)	HIGHLAND DEVELOPMENT CORP.	2006	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL SUBDIVISION 23 LOTS	4,800	7,300	500	800
HO2006G003(01)	D.R. HORTON, INC.	2006	BALTIMORE GNEISS	TURNBURY GROVE 33-LOT SBDN	7,000	11,700	499	814
HO2006G004(01)	TOLL BROTHERS, INC.	2007	BOULDER GNEISS WISSAHICKON FORM.	EDGEWOOD FARM SUBDIVISION - 60 LOTS	12,700	21,200	519	793
HO2006G005(01)	MANNARELLI & SONS	2006	WISSAHICKON FORMATION	MANNARELLI & SONS	2,400	4,000	555	783
HO2006G006(01)	CLOVERFIELD/PFEFFERKORN, LLC	2006	BOULDER GNEISS WISSAHICKON FORM.	CLOVERFIELD/PFEFFERKORN, LLC	4,700	7,800	535	803
HO2006G007(01)	MANNARELLI & SONS	2006	WISSAHICKON FORMATION	MANNARELLI & SONS	3,200	5,300	555	783
HO2006G009(01)	WARFIELD, JR., MR & MRS K.	2006	BOULDER GNEISS WISSAHICKON FORM.	69 LOT WARFIELDS SUBDIVISION	15,000	22,000	516	796
HO2006G011(01)	LDG INCORPORATED	2006	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL SUBDIVISION	4,900	8,200	540	812
HO2006G012(01)	HAILEY DEVELOPMENT LC	2006	LOWER PELITIC SCHIST WISSAHICKON	HAILEY DEVELOPMENT, LC	2,750	3,300	528	811
HO2006G014(01)	LEE, BRUCE	2006	WISSAHICKON FORMATION	16 LOT SBDN	3,400	5,700	552	780
HO2006G015(01)	FULTON RIDGE, LLC	2006	LOWER PELITIC SCHIST WISSAHICKON	RESIDENTIAL SUBDIVISION	3,000	5,000	485	819
HO2006G018(01)	DAVIS BRANCH ESTATES LLC	2006	BALTIMORE GNEISS	MYRTUE PROPERTES	6,600	11,100	542	835
HO2006G020(02)	HERITAGE LAND DEVELOPMENT	2009	BALTIMORE GNEISS	160-L WALNUT CREEK SUBD	34,000	56,000	510	815
HO2006G021(03)	JEANNE C. HODDINOTT	2010	BALTIMORE GNEISS	ENCLAVE AT TIERNEY FARM RES SUBD	8,500	14,100	496	817
HO2007G001(01)	RIDGE VIEW LLC	2007	IJAMSVILLE FORM.-MARBURG SCHIST	SINGLE FAMILY HOME SUBDIVISION	3,800	6,400	546	757
HO2007G002(01)	GRAYSON DEVELOPMENT CO	2007	BOULDER GNEISS WISSAHICKON FORM.	GRAYSON DEVELOPMENT CO.	9,700	16,200	530	787
HO2007G003(02)	SPRING MILL LLC	2010	BOULDER GNEISS WISSAHICKON FORM.	15-L CLOVERFIELD SECTION II RES SUBD	3,200	5,300	536	802
HO2007G004(01)	GREEN, KATHLEEN	2007	LOWER PELITIC SCHIST WISSAHICKON	CROSSROADS PUB - PDWIS# 113-1026	400	600	512	804
HO2007G005(03)	ELM STREET DEVELOPMENT, INC.	2009	IJAMSVILLE FORM.-MARBURG SCHIST	14-L CHELSEA KNOLLS RES SUBD	3,000	5,000	540	757
HO2007G011(01)	QUARTZ HILL, LLC	2007	BOULDER GNEISS WISSAHICKON FORM.	QUARTZ HILL RESIDENTIAL SUBDIV	2,600	4,500	550	796
HO2007G012(01)	HOMEWOOD LLC	2007	LOWER PELITIC SCHIST WISSAHICKON	HOMEWOOD, LLC - RIVERWOOD SUBDIV	300	500	516	825
HO2007G013(01)	SKIRVEN ENTERPRISES, INC.	2008	WISSAHICKON FORMATION	29-LOT THE LEGACY RES SUBD	6,400	10,000	522	774
HO2008G001(02)	GREENFIELD HOMES, INC.	2009	BALTIMORE GNEISS	14-LOT WILLOW POND RESIDENTIAL SUBD	3,000	5,000	495	814
HO2008G004(01)	JOHNS HOPKINS UNIV./APL	2008	LOWER PELITIC SCHIST WISSAHICKON	COOLING WATER, IRRIGATION, BACKUP	5,000	10,000	487	830
HO2008G010(01)	HERITAGE LAND DEVELOPMENT	2009	BOULDER GNEISS WISSAHICKON FORM.	MERIWETHER-SECT.2, PHASE 1&2	9,700	16,200	519	791
HO2008S002(01)	ROBERT M. HANEY	2009	CATTAIL BRANCH	NURSERY IRRIGATION	46,000	169,600	548	781
HO2008S006(01)	THOMAS, BENNETT AND HUNTER	2008	PATAPSCO RIVER	DUST CONTROL, PATAPSCO WATERSHED	1,000	5,000	550	834
HO2008S007(01)	THOMAS, BENNETT AND HUNTER	2008	PATUXENT RIVER	DUST CONTROL, PATAPSCO WATERSHED	1,000	5,000	540	754
HO2008S008(01)	STATE HIGHWAY ADMINISTRATION	2008	PATUXENT RIVER	WATER FOR DRILLING AND CORING	300	1,000	500	860
HO2008S009(01)	RED HILL LAWN SERVICE, INC.	2008	PATUXENT RIVER	HYDROSEEDING	1,500	6,000	500	860
HO2009G001(01)	THE BRANTLEY GROUP	2009	LOWER PELITIC SCHIST WISSAHICKON	TERRAPIN CROSSING SUBDIVISION	9,900	16,600	532	811
HO2009G002(01)	JOHN R. CLIME	2009	BALTO. GABBRO COMPLEX	JOHN R. CLIME-NURSERY	3,000	12,000	539	7828
HO2010G001(01)	VLADIMIR BLYUKHER	2010	LOWER PELITIC SCHIST WISSAHICKON	GWHP- STANDING COLUMN WELL	6,000	9,000	513	830

TABLE 5**INVENTORY OF EXISTING IMPOUNDED WATER SUPPLIES IN HOWARD COUNTY**

Owner	Crest Elevation (Feet above Sea Level)	Spillway Length (Feet)	Total Length of Dam (Feet)	Flooded Crest Above Stream Bed (Feet)	Area of Crest Elevation (Acres)	Length of Shoreline at Crest Elevation	Area of Land Owned (Acres)	Water Overflowed Crest for First Time	Capacity of Reservoir (Million Gallons)	Safe Yield (MGD)	Average Daily With- drawals (MGD)
Municipal											
Triadelphia Reservoir Washington Suburban Sanitary Commission	366.4	234	995	65	800	15 miles	5986	1943	6500	70	56
T. Howard Duckett Reservoir Washington Suburban Sanitary Commission	286.4	190	840	126	810	20 miles		1954	6000		

TABLE 6

INVENTORY OF EXISTING WATER TREATMENT FACILITIES

Owner	Water Source*	Type of Treatment	Plant Coordinate Location	Rated Plant Capacity (MGD)	Average Production (MGD)	Max. Peak Flow (MGD)	Storage Capacity (MGD)	Planned Expansion MGD/Date	Method of Sludge Disposal	Operating Agency
Community Water Supplies										
Franciscan Fathers		PC,PH,CC	819-518				0.006			Private
Non-Community - Institutional										
Howard County Dept. of Education		PH,CC								
Bushy Park E.S.		PH,CC	793-534							
Clarksville E.S.		PH,CC	820-505							
Lisbon E.S.		PH,CC	780-545							
West Friendship E.S.		PH,CC	815-535							
Gateway		PH,CC	816-502							
Glenwood M.S.		PH,CC								
Howard Vocational Tech.		PH,CC								
Scaggsville Public Works Annex			828-478							
Glenelg Country School			811-517							
Our Lady of Perpetual Help		PC	866-512							
St. Louis School		PH,CC, GAC	816-500							
Sisters of Bon Secour		F,PH	829-546	0.01	0.016		0.008			
Marriottsville Spiritual Center			829-545	0.01	0.01		0.05			Private
University of Maryland		PH,PC	815-515	0.043	0.035		0.05			Private
Agricultural Experiment Farm										
Gateway School			820-493							
Glenelg High School										
Glenwood Middle School										
Lisbon Children Christian School										
Trusted System Information										
George's Superthrift										
Peter Pan Day Care										

TABLE 6

INVENTORY OF EXISTING WATER TREATMENT FACILITIES

Owner	Water Source*	Type of Treatment	Plant Coordinate Location	Rated Plant Capacity (MGD)	Average Production (MGD)	Max. Peak Flow (MGD)	Storage Capacity (MGD)	Planned Expansion MGD/Date	Method of Sludge Disposal	Operating Agency
W. Friendship Shopping Center										
Boarman's Foodland			812-490							
C.J.'s Beef Barn			794-535							
Circle D Farm			786-538							
Clarksville Vol. Fire Co.			817-501							
Cooksville Carry-Out			794-544							
County Line Deli			829-553							
Crown's Pub			836-510							
Duke's Place			809-557							
Friendly Inn			829-529							
Henkel's Restaurant			859-471							
High's-Clarksville			817-501							
High's-Fulton			822-481							
Howard Co. ARC/Ellicott City			823-514							
Larriland Farms			771-540							
Lee's Market			780-547							
Lisbon Vol. Fire Dept.			779-547							
Little George's			794-535							
Marshall's Pub			805-514							
Morgan Station Inn			786-546							
Mountain View Inn			748-550							
Poplar Springs Inn			774-550							
Schooly Mill Park			811-487							
Station House/Ledo's Pizza			821-480							
Sykesville Station			809-558							
Thompsons Liquors			830-483							
West Howard Swim Club			779-552							
Woodbine Inn			782-556							
Woodstock Inn			837-545							
W. Friendship Vol. Fire Co.			814-535							

TABLE 6

INVENTORY OF EXISTING WATER TREATMENT FACILITIES

Owner	Water Source*	Type of Treatment	Plant Coordinate Location	Rated Plant Capacity (MGD)	Average Production (MGD)	Max. Peak Flow (MGD)	Storage Capacity (MGD)	Planned Expansion MGD/Date	Method of Sludge Disposal	Operating Agency
Non-Community - Apt Building										
Villas at Cattail Creek			788-527		0.025	0.038				
Non-Community - Industrial, Recreational										
Belmont Conference Center			873-517							
Church of God Campground		PC	833-517							
Concrete Pipe and Products			861-483							
Howard County Fair Grounds			808-538							
Hammond Park Pool			834-479							
Hydronautics Inc.	Wells & Surface Waters		823-487							
Nixon's Farm Inc.			813-533							
Transco Company Town		untreated	818-522		0.05					Private
Rocky Gorge Driving Range			826-475							
C.R. Daniels		PC	853-540		0.003		0.047			Private

TABLE 6A

PUBLIC WATER STORAGE FACILITIES

Facility	Road Location	ADC Map Coordinates	Overflow Elevation (Feet)	Useable Capacity (MG)
Snowden River	Snowden River Parkway	16-D11	550	2.00
Scaggsville	Clifford Ct near US Rt 29	19-B5	545	3.00
Oakland Ridge	Md. Rt 108	16-D4	630	1.50
Jonestown	Md. Rt 108	16-E5	630	0.20
Harpers Choice	Cedar Lane	15-C4	630	1.00
Bethany	Md. Rt 99	11-H4	630	0.20
Greater Baltimore Food Market	Md. Rt 175	20-J3	400	0.75
Alpha Ridge	Alpha Ridge Landfill	10-J2	730	0.30
Fulton	Md. Rt 216	18-J5	630	0.50
Proposed				
Marriottsville	Alpha Ridge Landfill	11-A2	630	1.25
New Guilford	US Rt 1	20-E5	400	2.00
Reclaimed Water				
Guilford	US Rt 1	20-E5	390	3.00*

* Useable Capacity 1.0 MG

TABLE 6B

WATER PUMPING STATIONS

Facility Name	Road Location	ADC Map Coordinates	Lower/Upper Zone	Existing /Design Capacity (MGD)
All Saints	Superior Avenue	19-G11	330/400	5.00
Chestnut Hill	US Rt 40	12-G5	550/630W	1.60
Columbia	Banneker Rd	15-F6	550/630W	4.00
Edgar Rd	US RT 108	16-A1	550/630E	2.80
Elkridge	Elibank Drive	17-G5	2nd Zone/550	18.00
Frederick Rd	Rt 144	11-C6	630W/730	0.58
Montgomery Rd	Montgomery Road	12-E13	550/630E	2.60
Pine Orchard	US Rt 40	11-J7	550/630E	5.2 ⁽⁴⁾
Rt 29	US Rt 29	15-K1	550/550 ⁽²⁾	24.00 ⁽³⁾
Rt 32	Guilford Road	20-C4	400/550	Standby ⁽¹⁾
Rt 216	Rt 216	19-A5	550/630S	0.30
Maple Lawn	Maple Lawn Boulevard	19-A4	550/630S	0.30
Whiskey Bottom	Whiskey Bottom Rd	19-H9	400/550	Standby ⁽¹⁾
Proposed				
Marriottsville	Alpha Ridge Landfill	11-A2	630W/730	3.2 ⁽⁵⁾
Reclaimed Water				
LPWRP PS	Greenwood Place	20-D9	400 Zone (reclaimed)	3 ⁽⁵⁾

Notes:

- 1) Pump stations designated as "standby" are utilized only during emergency periods.
- 2) Transmission Booster Station in the 550 Zone
- 3) Projected Ultimate Capacity; initial installed capacity is 16 mgd
- 4) Projected Ultimate Capacity; initial capacity is 3.7 mgd
- 5) Projected Ultimate Capacity. One pump can be added to increase capacity to 5 mgd.

TABLE 7

**INVENTORY OF GROUND WATER PROBLEM AREAS IN
HOWARD COUNTY, MARYLAND**

1.	Location:	Beaufort Park Subdivision, off Reservoir Road, South of Route 216
	Service:	No planned service area
	Nature of Problem:	Some residents have reported difficulties in obtaining adequate yields from wells.
	Planned Correction Date:	The subdivision is located outside the Metropolitan District; no service extension is planned.
2.	Location:	Lisbon, a town center on Route 144 in the western part of the County
	Service:	No planned service area
	Nature of Problem:	Lisbon is an area of older residences and business which are situated in relatively close proximity, on comparatively small lots. The results of well sampling indicate that the ground water has bacteriological contamination likely caused by subsurface wastewater disposal; and also petroleum hydrocarbon contamination possibly related to the two fuel service stations, or other sources in Lisbon. The County's consultant (KCI) obtained samples from thirty wells at twenty-nine properties in September-October 2006. The results of the sampling were as follows: the nitrate concentrations in five samples exceeded the EPA maximum contaminant level of 10 milligrams per liter; the total coliform concentrations in seventeen samples exceeded the maximum contaminant level; and in three of the seventeen samples with coliforms, E. coli were detected. Petroleum compounds have been detected in ground water at the two service stations in Lisbon.
	Planned Correction Date:	The County recommended a shared subsurface wastewater disposal facility for the Lisbon historic district. A majority of the property owners were not interested in a County owned system at this time.
3.	Location:	Ritz Estates Subdivision, north of Route 144 in the western part of the County
	Service:	No planned service area
	Nature of Problem:	Nitrate concentrations exceeding the maximum contaminant level of 10 milligrams per liter have been detected in residential wells.
	Planned Correction Date:	The subdivision is outside the Metropolitan District. No service extension is planned. Individual nitrate removal devices may be used to reduce excessive nitrates.
4.	Location:	Gaither Farm Estates, on Route 108 northeast of Clarksville
	Service:	No planned service area
	Nature of Problem:	Nitrate concentrations exceeding the maximum contaminant level of 10 milligrams per liter have been detected in residential wells.
	Planned Correction Date:	The subdivision is outside the metropolitan district. No service extension is planned. Individual nitrate removal systems may be used to reduce excessive nitrates.

TABLE 7

**INVENTORY OF GROUND WATER PROBLEM AREAS IN
HOWARD COUNTY, MARYLAND**

5.	Location:	Meadow Ridge subdivision, off Henryton Road in the northern part of the County
	Service:	No planned service area
	Nature of Problem:	Some residents have reported difficulty in obtaining adequate yields from wells.
	Planned Correction Date:	The subdivision is outside the Metropolitan District. No service extension is planned.
6.	Location:	Wynfield subdivision, off Route 144
	Service:	No planned service area
	Nature of Problem:	Some residents have reported difficulty in obtaining adequate yields from wells
	Planned Correction Date:	The Subdivision is outside the Metropolitan District. No service extension is planned.
7.	Location:	Fox Creek Subdivision, Off Route 144
	Service:	No planned service area
	Nature of Problem:	Some residents have reported difficulty in obtaining adequate yields from wells.
	Planned Correction Date:	The subdivision is outside the Metropolitan District. No service extension is planned.
8.	Location:	Monticello Drive
	Service:	No planned service area
	Nature of Problem:	The Maryland State Highway Administration (SHA) has replaced wells at four homes along Monticello Drive due high sodium chloride levels. Residents expressed concern when water heaters, shower fixtures, etc. needed to be replaced due to the corrosive nature of the groundwater with high chloride levels.
	Planned Correction Date:	The subdivisions are outside the Metropolitan District. No service extension is planned. The Health Department will continue to work with property owners and SHA to determine if alternate well sites, point of use reverse osmosis systems (RO), or whole house RO will solve the problem.

TABLE 7

**INVENTORY OF GROUND WATER PROBLEM AREAS IN
HOWARD COUNTY, MARYLAND**

9.	Location:	Friendship Manor and Fox Creek
	Service:	No planned service area
	Nature of Problem:	Some property owners in these subdivisions and the adjacent section along Frederick Road have high levels of sodium chloride. One property owner has been negotiating with the Maryland State Highway Administration (SHA) regarding the installation cost of a whole house reverse osmosis system (RO) and the associated on-site sewage disposal system upgrade required to handle the additional water discharged as a result of the RO treatment.
	Planned Correction Date:	The subdivisions are outside the Metropolitan District. No service extension is planned. The Health Department will continue to work with property owners and SHA to determine if alternate well sites, point of use RO systems, or whole house RO will solve the problem.

TABLE 8

IMMEDIATE, 5 YEAR, 10 YEAR, AND COMPREHENSIVE PRIORITIES FOR WATER SYSTEM DEVELOPMENT

Key	Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs (\$)			Project Schedule			Pressure Zone	Model Run Year
					Total	PL660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.		
A	W-8200	In Progress	1357-574	Design and construction of improvement to the US 29 water pumping station to increase pumping capacity.	1,685,000	-	1,685,000	2010	2010	2012	550	
	W-8220 ¹	0-5 Years	N/A	A project for the planning, design and construction of major water facilities, mains, pumping stations, reservoirs and treatment plants in the Baltimore City Central Water System.	36,050,000	-	36,050,000	on-going	on-going	on-going	N/A	N/A
	W-8245	0-5 Years	Various Sites	Project to repair/repave existing county roads due to watermain breaks	2,374,000		2,374,000	on-going	on-going	on-going	N/A	N/A
	W-8248	In Progress		Design and construction of water and sewer lines in conjunction with Maryland State Highway Administration and Howard County road projects prior to road construction.	7,650,000	-	7,650,000	on-going	on-going	on-going	-	N/A
B	W-8249	In Progress	1376-556	Replacement of approximately 9,000 ft. of 16" water main in Meadowridge Road between US Route 1 and MD Route 100.	3,700,000	-	3,700,000	2003	2009	2011	550/400	N/A
	W-8255	In Progress	1387-557	Study and rehabilitation of 17,000 ft. of water main in the Harwood Park area.	5,950,000	-	5,950,000	2004	2009	2010	400	N/A
C	W-8262	0-5 Years	1366-541	Design and construction of a 2.0 million gallon elevated water storage tank and related piping to serve the 400 Water Service Zone. (Guilford)	5,275,000	-	5,275,000	2004	2013	2014	400	2015
D*	W-8263	In Progress	1338-598	Design and construction of a 1.25 million gallon elevated water storage tank and related piping to serve the 630 Water Service Zone (Marriottsville)	5,800,000	-	5,800,000	2004	2011	2012	630W	2015
E	W-8264	In Progress	1343-590	Design and upgrade of the Frederick Road Water Pumping Station.	1,075,000	-	1,075,000	2004	2010	2011	630W/730	2015
F*	W-8265	In Progress	1353-560	Rehabilitation or replacement of 1,000 linear feet of 30-inch diameter water main in the vicinity of US 29 and Broken Land Parkway.	2,680,000	-	2,680,000	2005	2011	2012	550	N/A
	W-8267	In Progress	Various Sites	Project to develop a water valve database and provide for a continuing maintenance program for exercising of valves	1,177,000		847,000	2008	on-going	on-going	on-going	on-going
	W-8269 ²	0-5 Years		Design and construction of major transmission mains to convey public water from Baltimore City to Howard County. The project will fund a cost sharing agreement between Baltimore City, Baltimore County and Howard County on improvements to the Baltimore City's Western Third Zone.	35,000,000	-	35,000,000	2005	on-going	on-going	N/A	N/A
	W-8274	0-5 Years	Various sites	Project to Upgrade the Bureau of Utilities SCADA System	1,108,000	-	1,108,000	2007	2007	2011		
	W-8276	In Progress	1396-568	A project to evaluate the condition of 38,000 feet of 54-inch and 36-inch PCCP water transmission mains in Baltimore and Howard Counties and to repair or replace defective portions of pipeline.	17,500,000		17,500,000	2005	2011	2012	N/A	N/A
	W-8286	In Progress	1384-559	A project to evaluate the condition of 12,500 feet of water main in the Ducketts Lane area between US Route 1 and I-95 and to rehabilitate or replace defective portions of the main.	3,590,000		3,590,000	2010	2011	2012	550	N/A
	W-8289	In Progress	Various Sites	Project to replace/upgrade batteries and radio modules for the County's radio read water meter system	5,176,000		5,176,000	N/A	2009	2016	N/A	N/A
	W-8290	In Progress		Project to Upgrade the Bureau of Utilities maintenance Yard	2,400,000		2,400,000	2011	2012	2012	N/A	N/A
	W-8291	In Progress		Project to provide recoating/repairs of the County's Elevated Water Tanks	1,401,000		1,401,000	on-going	on-going	on-going	N/A	N/A
G	W-8292	In Progress	1379-547	Design and construction of 5,500 feet of 12-inch water main and relocation of 1,500 feet of sewer main within proposed Dorsey Run Road.	1,900,000		1,900,000	2009	2011	2013	400	N/A
	W-8293	In Progress	1347-561	Design and construction of 500 feet of 8-inch main to loop water system from Jerrys Drive to Hickory Ridge Road.	210,000		210,000	2009	2011	2012	550	N/A
	W-8294	In Progress	1363-571	Design and construction of 600 feet of 8-inch main to loop water system from Rumsey Road to Executive Park Drive.	335,000		335,000	2009	2011	2011	630E	N/A
H*	W-8296	In Progress	1354-564	Construction of 18,000 ft. of 36" water transmission main along U.S. Route 29 from the Route 29 Pumping Station to Broken Land Parkway.	21,500,000	-	21,500,000	2010	2012	2014	550	2015
I*	W-8297	In Progress	1347-546	Construction of a water transmission main along Kindler Road from First League to Woodstream Way. This main will consist of 3,100 ft. of 12" pipe.	1,200,000	-	1,200,000	2010	2011	2012	550	2015
J	W-8299	In Progress	1354-587	Upgrading the Pine Orchard pump station by adding one pump.	1,150,000	-	1,150,000	2011	2012	2013	550/630W	

TABLE 8

IMMEDIATE, 5 YEAR, 10 YEAR, AND COMPREHENSIVE PRIORITIES FOR WATER SYSTEM DEVELOPMENT

Key	Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs (\$)			Project Schedule			Pressure Zone	Model Run Year
					Total	PL660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.		
K*	W-8300	In Progress	1395-565	Construction 3,900 ft. of 12-inch water parallel transition main along Levering Ave and Main Steet.	2,750,000	-	2,750,000	2010	2013	2014	400	2015
L	W-8301	In Progress	1338-556	Construction of a water transmission main along Guilford Road from Quiet Night Ride east to W.R Grace. This main will consist of 900 ft. of	370,000	-	370,000	2012	2013	2013	550/630-W	2015
	W-8302	In Progress	1364-589	Construction of approximately 1,100 ft. of 12" water main between Town and Country Blvd. and U.S. Route 40.	530,000	-	530,000	2011	2012	2012	550/630W	
M	W-8303	6-10 Years	1387-556	Construction of approximately 3,000 ft. of 8" and 12" water main along Loudon Avenue and the railroad from Loudon Avenue to Hanover Rd.	1,000,000	-	1,000,000	2014	2015	2016	400	2020
N	W-8305	6-10 Years	1377-569	Construction of 4,300 ft. of 12" water main in Landing Road from Grovemont Subdivision to Montgomery Road.	1,500,000	-	1,500,000	2015	2016	2017	550	2020
O	W-8306	0-5 Years	1341-549	FY16 Sanner Road Water Main Loop. 5,800 ft. of 12-1inch water main	2,000,000		2,000,000	2013	2014	2015		2020
P*	W-8307	0-5 Years	1354-554	Construction of a water transmission main along Broken Land Pkwy. from Stevens Forest Road to Cradlerock Way. This main will consist of 4,100 ft. of 30" pipe, and will provide for improved integration of the U.S. Route 40 and Elkridge supplies.	5,000,000	-	5,000,000	2013	2015	2016	550	2020
Q*	W-8308	0-5 Years	1344-547	Construction of 14,000 ft. of 24" water transmission main along U.S. Route 29 from Old Columbia Road to MD Route 216.	10,500,000	-	10,500,000	2013	2015	2016	550	2020
R	W-8309	Comprehensive	1368-547	Construction of a water main from Mission Road to and along MD Route 175 and across I-95 to connect to Columbia Gateway. This main will consist of approximately 9,500 ft. of 12" pipe.	4,400,000	-	4,400,000		2021	2022	550	2025
	W-8310	In Progress		Design and Construction of 700 ft. of 8" water main from Marlo Austin Way to seve 7 properties off of Kerger Road.	230,000		230,000		2012	2013		N/A
S	W-8311	In Progress		Construction of 6,200 ft. of 8" replacement water main within U.S. 40 from U.S. 29 to Dogwood Drive.	2,300,000	-	2,300,000	2011	2012	2013	550	2015
	W-8312	In Progress		Design and Construction of 1,00 ft. of 8" water main from the terminus of County owned Rockburn Hill Road, west to Crossview Road to serve 6 properties	530,000	-	530,000		2012	2013	550	N/A
	W-8313	In Progress	Various Sites	Project to provide on going fire hydrants inspections and maintenance	762,000		762,000	on-going	on-going	on-going	N/A	N/A
	W-8314	0-5 Years		Project to study the implementation of a Reclaimed Water System	150,000		150,000	2012	2012	2012	N/A	N/A
	W-8315	0-5 Years		A project to study the County's elevated water storage needs to meet existing and future demands for domestic use and emergency storage in those areas.		-		2012	2013	2014	-	N/A
T*	W-8316	0-5 Years	1375-569	Replace approximately 5,800 ft. of 8" pipeline in Ilchester Road with 12" water main and/or construct additional looping							630-E	2015
	W-8317	0-5 Years		Project to install an emergency genearator system at the elkridge Water Pumping Station, based on 2007 Design.	1,500,000		1,500,000	2013	2014	2014	550	N/A
	W-8318	0-5 Years		Project ot replace approximately 12,000 ft of deteriorated 12" cast iron watermain, including valves, along Montgomery Road from Layers Hill road to Rockburn Drive.				2014	2015	2015	550	N/A
	W-8319	0-5 Years		Project to upgrade the existing county wter pumping stations, elevated water tanks, pressure regulating valves, and other facilities by in-house maintenance staff	500,000		500,000	N/A	2013	on-going	N/A	N/A
	W-8600	In Progress		Design and construction of various additions and improvements to the water and sewer system utility or its associated infrastructure.	9,615,000	-	9,615,000	on-going	on-going	on-going	-	N/A
	W-8698	0-5 Years		A project to design and construct routine water main extensions in the Metro District request by landowners.	1,900,000	-	1,900,000	on-going	on-going	on-going	N/A	N/A
	W-8810	0-5 Years		A project to provide construction and inspection service for sites which do not require developer agreement but require larger than 1" water house connection, fire hydrants and other water appurtenances.	200,000	-	200,000	on-going	on-going	on-going	N/A	N/A
	W-8860	0-5 Years		A project to provide for the construction of water house connections by the Bureau of Utilities for residential size (1-inch) connections. These connections are made when new connections are required for lots or	100,000	-	100,000	on-going	on-going	on-going	N/A	N/A

TABLE 8

IMMEDIATE, 5 YEAR, 10 YEAR, AND COMPREHENSIVE PRIORITIES FOR WATER SYSTEM DEVELOPMENT

Key	Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs (\$)			Project Schedule			Pressure Zone	Model Run Year
					Total	PL660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.		
	Developer Project	0-5 Years	1368-541	Construction of approximately 6,500 ft. of 12" water main from Washington Blvd. to Mission Road and approximately 4,000 ft. of 12" water main along Mission Road south to Washington Blvd.							400/550	
U	Developer Project	6-10 Years	1347-595	Construction of a water transmission main from Resort Road to Bethany Lane and associated pipes. This main will consist of approximately 4,200 ft. of 12" pipe.							550	
V	Developer Project	6-10 Years		Construction of approximately 28,000 ft. of 12" water distribution main south of Johns Hopkins Road and West of Route 29							630-S	2010
	Developer Project	Comprehensive	1393-559	Construction of 6,500 ft. of 8" water main along Race Road from Hanover Road to the existing 8" main in Race Rd.							400/300	
	Developer Project	6-10 Years	1379-574	Construction of 8" water main connecting Landing Road to College Ave.							550	
	Developer Project	0-5 Years	1342-594	Extension of 16" watermain through Waverly Woods Golf Course								

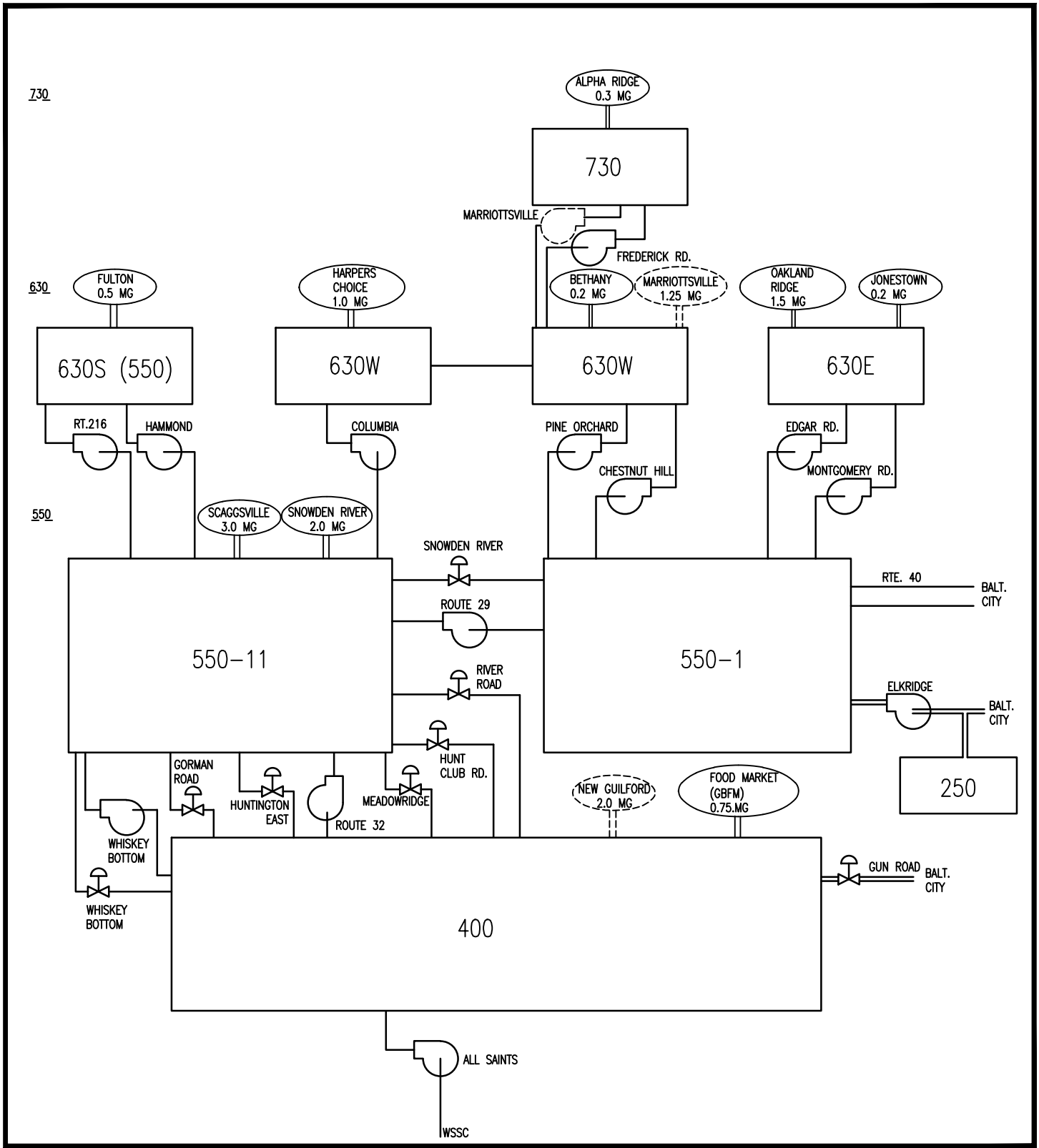
¹ Scheduling of facilities to be determined by Water Analyzer Office and specified in Central System Report.


² Required facilities were identified in the Report on the Western Third Zone of the Baltimore Water System (August, 1984).

*Priority Projects

Note: Projects which are not identified as capital projects may be constructed in the time frame indicated, or at an earlier time by a private developer if earlier construction would provide an orderly system extension.

	In Progress
	0-5 years (2015)
	6-10 years (2020)
	11-15 years (2025)



 <p>801 South Caroline Street, Baltimore, MD 21231 WHITMAN, REQUARDT & ASSOCIATES, LLP</p>	<p>Client HOWARD COUNTY, MD.</p>	<p>WATER SYSTEM SCHEMATIC</p>	Drawing No.
			Check:
	<p>Date: OCT 2011</p>	<p>FIGURE 13</p>	Drawn:
			Des:

Scale: NTS

WATER PRESSURE ZONES

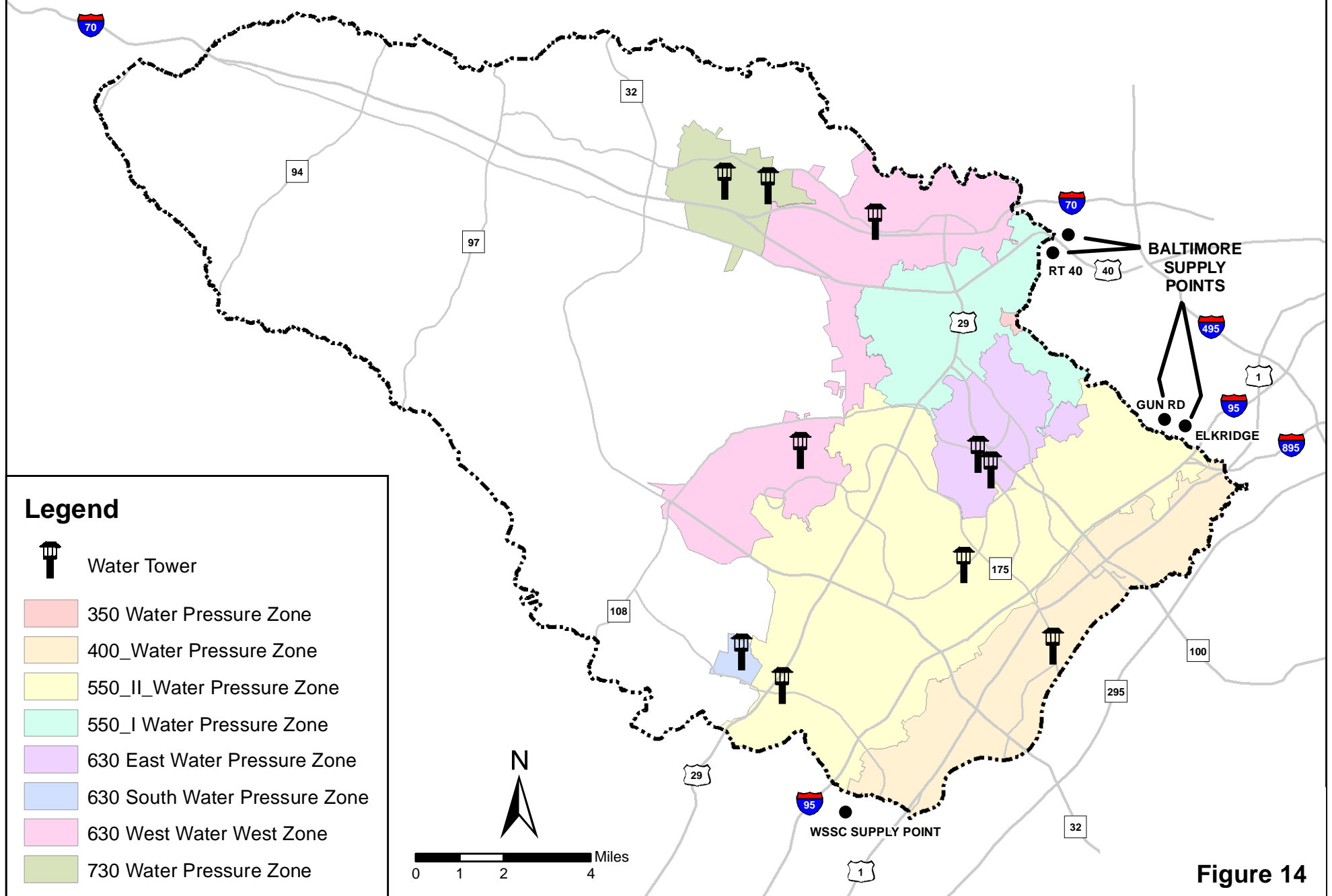


Figure 14

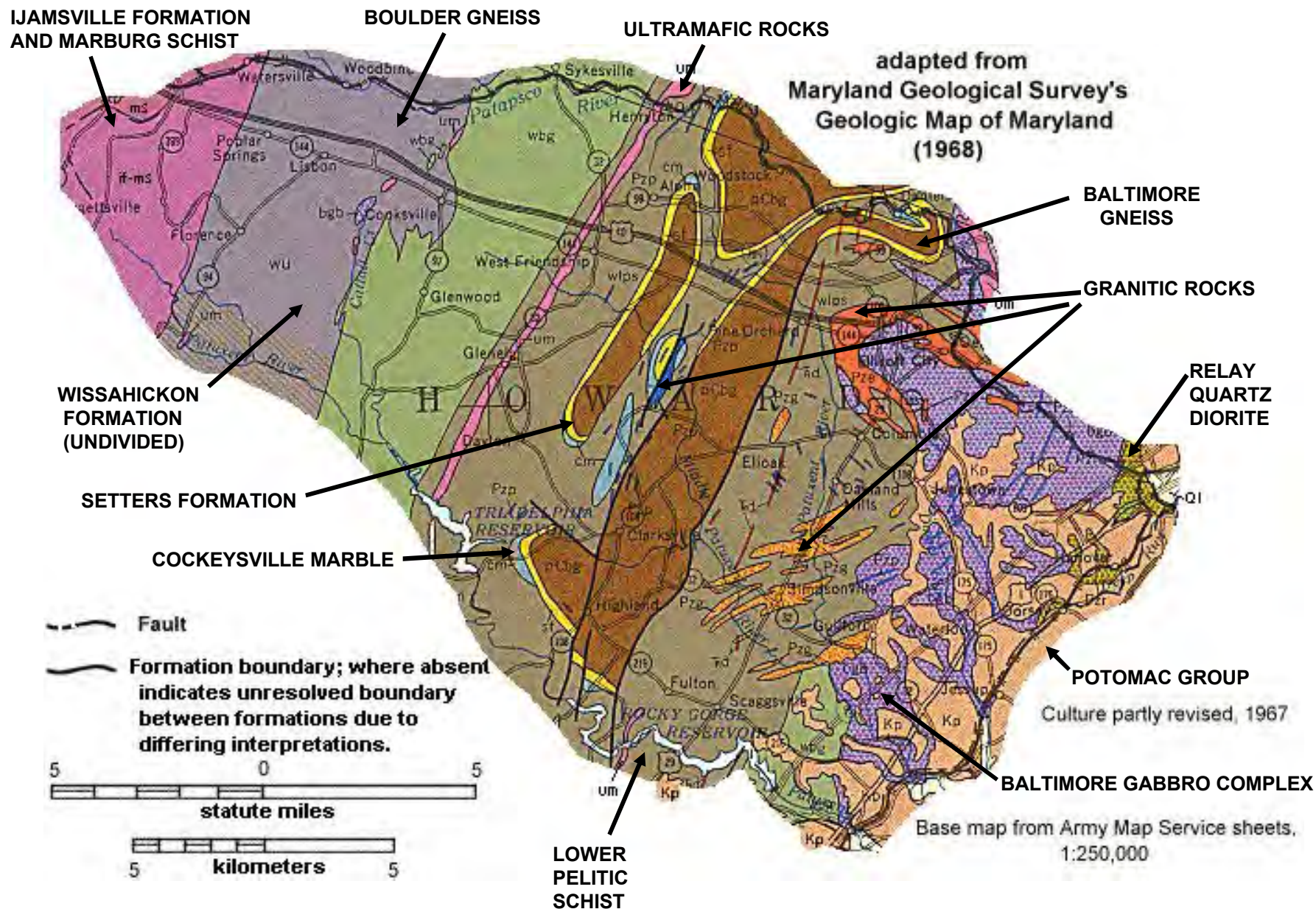
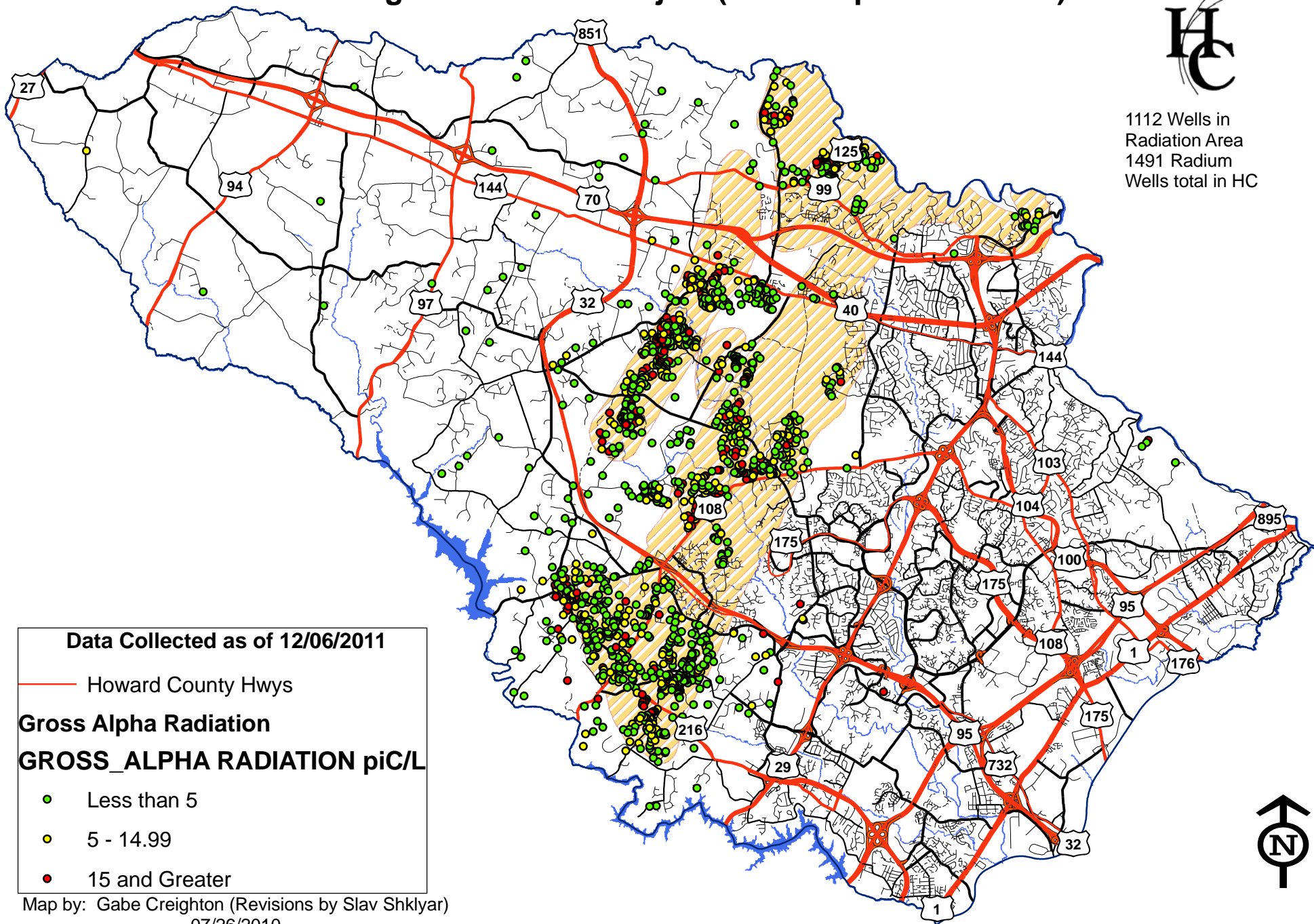


Figure 15 – Generalized Geologic Map of Howard County, Maryland

Howard County Health Department; Bureau of Environmental Health On-Going Well Radium Project (Gross Alpha Radiation)



1112 Wells in
Radiation Area
1491 Radium
Wells total in HC



CHAPTER 4

THE SEWERAGE PLAN

General

Presently, sewage flows in the County's public system are divided between two service areas. These two areas are:

- (1) The Patuxent service area, served by Howard County's Little Patuxent Wastewater Reclamation Plant on the Little Patuxent River.
- (2) The Patapsco service area, served by the Patapsco Interceptor which flows to Baltimore City's Patapsco Wastewater Treatment Plant.

Since a portion of Howard County is located in the Patapsco service area, planning for sewage disposal must take into consideration the planning of neighboring counties and Baltimore City. The remaining sewage not collected by the public system is disposed of utilizing private systems, including both individual and shared sewage disposal facilities.

Sewage Treatment Requirements

The present average daily sewage contribution to Howard County's public system is 24.7 MGD (2006 flows). This system serves approximately 85.3% of the County's population. By the year 2035, the public sewer system is expected to serve approximately 84.8 % of the County population. This slight variance in the calculation of percentages is considered to be “no change” to the projected distribution of public sewer service throughout the County during the planning period. The projected population served by the system is illustrated in Chapter 2, Table 1B.

Table 9 shows projected sewage flows and planned treatment capacity through the year 2035 for each of the major sewer service areas. Sewer service area boundaries were modified from the 2008 Master Plan to match the drainage area boundaries observed in the development of the sewer model. The area served by the Route 108 Pump Station is identified separately. This area was diverted to the Patapsco service area from the Patuxent service area between 1984 and 1997, has been diverted intermittently since that time and remains in service for use as needed.

Table 9A provides a more detailed breakdown of average flows for the sub-areas which comprise the major service areas. The locations at which sub-area flows were computed are shown in Exhibit 10. Projections of average daily sewage flows for the years 2010 through 2035 which appear in Table 9A are based on population and land use projections for statistical areas where sewer service is planned.

Sewage flow projections for residential, commercial and industrial shown in Table 9A for average daily flows were developed based on data collected from DPZ projections for future growth and development. Average Inflow & Infiltration (I&I) flow was computed from the July 2010 Water & Sewer Allocation Report as the difference between the flow recorded at the County's revenue meter and the average daily water usage summarized from the water account billing record accounts.

Existing average extraneous flow was computed as the difference between the total average daily flow and the average daily base flow during non-rainfall periods, and during months when groundwater elevations are generally highest.

Sewage flow projections for the hydraulic modeling were developed based on data collected during flow metering programs that took place in 2001 and 2010 with water usage records for the winter quarter 2010. The population projections from DPZ were used to allocate future growth and development. The existing water records, flow metering results, DPZ projections were combined with infiltration and inflow in response to the March 12 – 14, 2010 rainfall event to develop the flow inputs for the hydraulic model using XP-SWMM software. Future residential flows were peaked based on the results of the flow metering programs and the future commercial and future industrial flows were peaked based on a synthetic diurnal pattern. Infiltration and inflow in the

future is assumed to be equal to that experienced during the March 12 – 14, 2010 rainfall event.

It is anticipated that infiltration and inflow will be controlled through the County's regular infiltration/inflow maintenance program. This program includes flow monitoring in interceptors and collectors, smoke testing to detect inflow sources, and televised inspection of sewer lines to detect other sources of extraneous flow. Corrective measures such as sewer TV inspection, test and seal grouting, mainline sewer relining, manhole repair, and lateral/line repair are implemented when excessive extraneous flows are found. It is planned that by the Year 2015, additional major line rehabilitation will be performed as part of the infiltration and inflow program.

In response to EPA Regulations, the Howard County Council passed, and the County Executive signed into law, two sections of the Howard County Code to regulate sewer system flows and user charges. These Code sections, which are updated on a timely basis, establish sewer use charges, excess strength surcharges, and industrial pretreatment requirements.

Howard County has received EPA approval of its user charge/surcharge program, and has established a surcharge recovery system for the Patapsco service area in cooperation with Baltimore City.

The purpose of the User Charge Program is to recover costs for operation and maintenance of the wastewater treatment and conveyance system. Each user's charge depends upon the volume of flow discharged. For industrial sewer system users there is an additional sewer use surcharge if their wastewater discharges have concentrations of suspended solids, biochemical oxygen demand or phosphorus greater than that normally found in domestic sewage.

Industries desiring to connect to the system are evaluated on a case-by-case basis. If the quantity or quality of the industry's discharge would interfere with or otherwise adversely affect the treatment capabilities of the treatment plant; if the discharge contains materials which would damage the conveyance system or components of the treatment process; or if pretreatment standards would be violated, the County requires pretreatment of the waste prior to discharge.

Requirements for pretreatment are established by the County, based in part on standards developed by EPA. Local standards have been developed to protect operation of the Little Patuxent Water Reclamation Plant and to control the quality of sewage sludge produced. This sludge, which is primarily disposed of by surface application on agricultural land, must conform with contamination limitations established by regulations of the Maryland Department of the Environment. Howard County began development of its Pretreatment Program in June, 1982. The Program was approved by the Department of the Environment in August, 1985, and has since undergone periodic updates with current modifications being implemented as part of the Howard County Consent Agreement with MDE (See paragraph below). The development of discharge standards is coordinated with Baltimore City so waste discharges to the Patapsco sewerage system will meet requirements established by the City. Details related to program operation may be found in the three volume report titled Howard County Industrial Wastewater Pretreatment Program. The biosolids program for Howard County currently relies on the production of a Class A sludge (refer to Sludge Disposal section of this chapter).

Consent Agreement

In March of 2010, the Howard County Department of Public Works (DPW) entered into a Consent Agreement with the Maryland Department of the Environment to take corrective actions on its sanitary sewer collection and treatment system in order to prevent sanitary sewer overflows (SSO's). In the Agreement, Howard County has agreed to a series of corrective measures including the development of a Capacity, Management, Operation, and Maintenance (CMOM) program along with performing Sanitary Sewer Evaluation Surveys (SSES) for each of its drainage basins.

As part of the CMOM program, DPW is proactively performing a systematic sewer cleaning, inspection, televised inspection, smoke testing, flow monitoring, and repair program based on metrics developed in the CMOM manual. The manual was submitted to and approved by the Maryland Department of the Environment on June 30, 2011, and is currently being implemented. Howard County DPW has created a full time position of "CMOM Manager", who along with an outside consultant is responsible for complete program development and insuring that milestones in the approved CMOM are

being met. In-house DPW maintenance crews as well as outside contractors perform the necessary field work to insure compliance.

DPW has also retained the services of two (2) outside consultants to conduct Sanitary Sewer Evaluation Surveys (SSES) for each of its drainage basins. The SSES for the Little Patuxent basin was submitted to MDE in May of 2010, and the Hammond/Guilford and Patapsco studies are to be submitted by the end of 2011. Work identified in the LP basin SSES is already underway, plus construction of the new Little Patuxent Parallel sewer which is scheduled for completion in the Spring of 2012. Various manhole and sewer deficiencies identified in the LPI SSES, as well deficiencies discovered in the Hammond/Guilford and Patapsco/Deep Run basins are being corrected under the CMOM implementation program.

In addition to the SSES projects, flow monitoring programs utilizing hydraulic modeling and field flow measurements are being used to identify various sewer segments requiring additional capacity. The DPW Sewer Capital Improvements Program (CIP) has been updated to include new projects resulting from this analysis and is included as part of the 2011 Master Plan.

Amendments to the Howard County Fats, Oils, and Grease (FOG) program have been developed and updated as part of the Consent Agreement, and are currently being implemented.

Howard County DPW is fully committed to performing the sewer system maintenance and conducting the capital improvements work necessary to eliminate and/or minimize sanitary sewer overflows (SSO's) from its sanitary sewer collection and treatment system.

Sewage Disposal - Private

Private individual septic systems presently serve approximately 14% of the population in Howard County and several commercial and industrial establishments. The efficiency of a septic system depends on soil characteristics. In July, 1968, the United States Department of Agriculture, Soil Conservation Service issued the results of a soil

survey for Howard County. Accompanying the detailed description of soils in the publication are aerial maps detailing each soil area in the County. The survey indicates that the use of septic systems is severely limited for 47% of the County, due to soils characterized by low permeability, shallow depth to bedrock or seasonal high water table. An additional 19% of the County is rated as having moderate limitations for the use of septic systems. 34% of the County's soils are rated as having slight limitations. Although severe limitations do not prevent the use of septic systems, special construction practices may be necessary to obtain County approval.

Private septic systems will continue to be used in the western portion of the County, while the use of private septic systems within the Metropolitan District will decrease as connections are made to the public sewerage system.

Private wastewater treatment plants other than septic systems are listed in Table 10. The County anticipates that industrial, commercial and institutional facilities located in the planned service area will eventually connect to the County's public sewerage system, provided they comply with capacity allocation and pretreatment requirements. Conveyance system improvements will be designed to accommodate flows from these facilities. Expected dates of abandonment have not been established for all of the facilities given in Table 10. Table 10A lists existing and planned wastewater discharges for which NPDES permits have been applied for or issued. Table 10C lists a summary of existing and planned community septic systems for facilities that have been assigned a permit number or have applied for one.

Wastewater disposal problem areas are inventoried in Table 11. The majority of the problem areas identified involve subdivisions where existing septic systems are failing. Areas with failing septic systems which can be served through an extension of the existing sewerage system are planned for service in accordance with schedules given in Table 13. Properties with failing septic systems outside the Planned Service Area will continue to be served by private on-site systems, unless the properties are immediately adjacent to the PSA, have public sewer available as determined by the Director of Public Works, and have been ordered to connect to the public sewer by the County's Environmental Health Department. Therefore, existing failed systems will require replacement or repair in conformance with County Environmental Health standards.

If Howard County receives complaints or identifies illicit discharges to streams, the County immediately responds to these occurrences. The County does not have any other specific on-going discharge issues that require attention. Table 12 has been omitted from this report for this reason.

Shared Sewage Disposal Systems

Undeveloped properties zoned RR and RC within the No Planned Service Area may be serviced by shared sewage disposal facilities. Howard County Code Title 18, Subtitle 12, and Title 20, Subtitle 8 establishes requirements and procedures for shared disposal facilities to serve cluster development permitted on RR and RC zoned land. These systems are proposed and constructed by private developers of residential subdivisions, and are designed to serve individual residential lots within a contiguous subdivision. Public facilities such as schools may also be included in a shared sewage disposal system (SSDS) that is owned and operated by the Board of Education. Shared sewage disposal facilities are designed in accordance with Department of Public Works standards and those of the County Health Department and the Maryland Department of the Environment. Each system must be reviewed and approved by the Department of Public Works, County Health Department, and MDE prior to construction.

Facilities generally consist of either gravity collection systems or pressure collection systems with pumps located in easements on individual lots. All wastewater is collected and treated at a single, contiguous treatment area (primary treatment). After treatment, the wastewater is distributed to a subsurface soil absorption field.

Shared Sewage Disposal Systems with design flows over 10,000 gallons per day (gpd) maximum daily design flow (MDDF) will be issued and subject to the requirements of a Maryland Department of the Environment Groundwater Discharge Permit. The Department of Public Works will accept only those proposed public large systems (\geq 10,000 gpd MDDF) that were included in the January 2006 amendment to the Water and Sewer plan. The Maryland Department of the Environment Groundwater Discharge Permits require that before the wastewater enters the subsurface soil absorption fields it must be treated at the headworks so that it contains a maximum of 30 parts per million (ppm) BOD, 30 ppm TSS and 10 or 8 ppm total nitrogen. Nutrient removal technologies are needed to meet the treatment required by the permits. Nutrient removal technologies

treat wastewater by subjecting it to an aerated zone or cycle, an anoxic zone or cycle, and clarification before distribution to the subsurface soil absorption fields. Sludge management systems are included with nutrient removal technologies to control solids inventory and minimize waste hauling. All nutrient removal technologies that DPW will accept must have demonstrated successful BOD, TSS and nutrient removal at a facility within Maryland. The large, permitted systems will be owned and operated by the developer until a year past 80% occupancy of the homes connected to the system.

At the discretion of MDE, SSDS with MDDF between 5,000 and 10,000 gallons per day may be subject to a Discharge Permit if MDE is concerned with soil, hydraulic, or nutrient migration conditions. MDE may also require a Discharge Permit for SSDS and systems with less than 5,000 gallons MDDF, but with 6 houses or more if there are nutrient migration concerns. Homes within developments identified as having nutrient migration concerns may have an on-site treatment system located on individual lots. These small, individual systems are the property and responsibility of the homeowners.

The smaller shared sewage systems that are less than 5,000 gpd MDDF and less than 6 homes do not require a discharge permit under most circumstances. MDE reserves the right to place restrictions or apply permits to any systems that may increase the nitrogen content of ground or surface waters at significant levels deemed injurious to the Chesapeake Bay. Primary treatment for the small, non-permitted systems in Howard County consist of septic tanks in a series that provide solids removal and the digestion of organic matter.

Shared sewage disposal facilities that do not require MDE discharge permits, and their related easements, become County property after construction. A developer's agreement, declaration of covenants, and deed of shared sewage disposal facility easement must be signed and in effect before the County takes full ownership of the system. For the large, permitted systems, in addition to the above mentioned documents, the property containing the treatment system and subsurface absorption fields will be deeded fee-simple to the Department of Public Works. Facilities operation and maintenance is the responsibility of the Department of Public Works. The users of the shared systems finance the maintenance of these systems through an annual payment of fees. Table 10B lists existing and planned shared sewage disposal facilities.

Sewage Conveyance and Treatment - Patapsco Basin

Presently, the Patapsco Interceptor, which is shared by Howard County, Baltimore County, Anne Arundel County and Baltimore City, receives sewage from Howard County at four metered connections: the Deep Run, Sucker Branch, Tiber Branch, and Bonnie Branch Interceptors.

The Furnace Avenue meter in Elkridge registers the flow from the Deep Run Interceptor serving most of the U.S. Route 1/Interstate 95 corridor from Elkridge to Waterloo and Jessup, and includes a component of sewage flow from Anne Arundel County from various sewage flow meters and direct interceptor connections. The Bonnie Branch Interceptor connects to the Patapsco Interceptor at Ilchester Road and serves the Ilchester, Worthington and Rockburn Park areas. The Main Street meter in Ellicott City registers flow from the Tiber Branch Interceptor which serves Ellicott City and areas immediately west of Route 29. The Route 108 Pumping Station is also tributary to the Tiber Branch Interceptor. Its discharge will flow through the Main Street meter when the pumping station is in operation. The Sylvan Lane meter registers flow in the Sucker Branch Interceptor which serves the area north of Ellicott City and west to Mount Hebron.

Collected flow data is used to analyze system flows and to determine the County's share of operating and maintenance costs for the Patapsco interceptor, pump station, and Patapsco Treatment Plant. Several agreements have been developed and approved between Howard and Baltimore Counties concerning the sharing of costs and capacity in the Patapsco system. The first agreement, executed on May 6, 1963 and later modified on February 28, 1964, provided for construction of the Patapsco Interceptor from Herbert Run to the Deep Run Interceptor and from the Deep Run Interceptor to Oak Forest Branch. In addition, the agreement provided for construction of the interceptor from Sucker Branch to a point 3,500 feet south of Ellicott City, terminating at a temporary treatment plant which has since been deactivated.

The second agreement, dated August 2, 1968 provided for construction of the Patapsco Interceptor from Oak Forest Branch to the temporary treatment plant specified above.

The third agreement, dated June 4, 1979 updated portions of the previous agreements, specified new cost sharing criteria, and established a peak flow limitation for Howard County at the Patapsco Pump Station of 17.8 MGD. The agreement was amended on June 5, 1982 to address conditions for construction of the parallel Patapsco Relief Interceptor. This amendment specified cost sharing arrangements and provided Howard County with a peak flow capacity downstream from the Deep Run Interceptor to the pump station of 27.6 MGD.

The fourth and final agreement, dated May 3, 1982, specified peak flow capacity purchased by Howard County in segments of the Patapsco Interceptor located upstream of the Deep Run Interceptor. The allocated capacities are given below:

<u>INTERCEPTOR SEGMENT</u>	<u>ALLOWABLE PEAK FLOW(MGD)</u>
Deep Run to Bull Branch	16.1
Bull Branch to Tiber Branch	15.1
Tiber Branch to Sucker Branch	4.0

The Patapsco Pump Station was to be designed for an initial flow of 45 MGD with provisions for future expansion to 70 MGD, and a current capacity of 59 MGD. Howard County's contracted share of the pump station's peak capacity is 39.6%. Therefore, when the pump station is upgraded to accommodate projected flows, Howard County is to assume the costs for providing 27.6 MGD of the total 70 MGD capacity. This capacity share will be adequate to provide for the County's needs until after year 2035.

The Patapsco 201 Facilities Plan indicates that the current 2-year frequency peak flow to the Patapsco Pump Station is conservatively estimated to be 61.9 MGD. The difference between this flow rate and the initial pump station capacity of 41.5 MGD can be attributed to higher than anticipated flows from the Baltimore County portion of the service area. In 1985, Baltimore County installed a third pump in the station that increased the safe capacity to 59 MGD. The station was designed to allow for a fourth pump to be installed which would increase the safe capacity of the station to 70 MGD.

The Patapsco 201 Plan also recommends an immediate increase in the station's safe capacity to at least 91 MGD which will be required to provide for future growth. The increase in future station capacity from 70 MGD to 91 MGD is necessary to accommodate flows from Baltimore County, which will be higher than originally projected.

The table below addresses capacity allocations for Howard County in the Patapsco interceptor. It was determined that existing allocations may not supply adequate capacity for all contributing jurisdictions, and Baltimore County's current 2-year frequency peak flow may exceed that jurisdiction's allocation in the interceptor between manhole no. 34848 and the Patapsco Pump Station and in the pump station itself. Flow allocations are specified in the June 4, 1979 agreement and its June 5, 1982 amendment. Howard County's capacity allocation and projected peak flows in sections of the Patapsco Interceptor are as shown below:

BRANCH DISCHARGE LOCATION	CUMULATIVE PEAK DESIGN FLOWS (MGD) IN PATAPSCO INTERCEPTOR ⁽²⁾		CONTRACTED PEAK FLOW CAPACITY (MGD)
	<u>2010</u>	<u>2035</u>	
Sucker Branch	3.61	3.94	4.0
Tiber Branch	5.76	6.14	15.1
Bonnie Branch	7.16	7.68	15.1
Deep Run ⁽¹⁾	14.13	16.61	27.6

(1) – Includes flow from Anne Arundel County

(2) – Excludes flow from Baltimore County

It has been determined that, based on present flow projections and increased levels of infiltration/inflow reduction, adequate interceptor hydraulic capacity is available to Howard County for the projected year 2035 flows. A reallocation of available capacity and cost shares through inter-jurisdictional agreements may be necessary to provide for each jurisdiction's needs as conditions within the drainage basin change.

Four agreements are in effect between Howard County and Anne Arundel County concerning construction cost and capacity allocation for the Deep Run Interceptor. The first agreement, dated August 28, 1963, covered the construction of the interceptor from

the Patapsco Interceptor to Elkridge. This agreement provided a peak capacity of 4.42 MGD to Anne Arundel County and the remainder of the rated 10.4 MGD total capacity to Howard County. A 33" diameter parallel sewer line has been constructed under Capital Project S-6124 to provide adequate capacity to convey Howard County flows. In addition, a 400 ft. section of the existing 33" diameter line has been rerouted and replaced with a 42" diameter line to accommodate the construction of Interstate Route 195. The siphon structure crossing the Patapsco River was reconstructed in 2005 under Capital project S-6240 to accommodate the projected flows as well as provide for a future third siphon barrel (currently under design). Anne Arundel County has informed Howard County that their existing capacity allocation of 4.42 MGD is adequate to meet future needs. Therefore, the provision of the increased capacity was funded entirely by Howard County.

The second section of the Deep Run Interceptor, between Elkridge and Hanover Road, was constructed under an agreement dated June 30, 1970, which allotted to Howard County a peak flow limitation of 19.78 MGD. The third agreement, dated December 11, 1973, covered the extension of the interceptor from Hanover Road to the town of Dorsey, Maryland. This agreement divides the portion of the interceptor addressed into three segments with capacity allocations as specified below:

<u>INTERCEPTOR SEGMENT</u>	<u>ALLOWABLE PEAK DESIGN FLOW (MGD)</u>
Hanover Road to Piney Run	12.48
Piney Run to Licking Creek	11.96
Licking Creek to Dorsey	5.8

The interceptor portion between Licking Creek and Dorsey serves Howard County only. Therefore, Howard County's flows in this segment are limited by the hydraulic capacity of the interceptor.

On March 30, 1979, Howard County and Anne Arundel County entered into an agreement to construct the Licking Creek Interceptor, a tributary to the Deep Run Interceptor along Licking Creek and Montevideo Road. This agreement includes cost sharing provisions and allocates a peak flow capacity to Howard County of 1.76 MGD. Howard County's capacity allocations and projected peak flows in the Deep Run Interceptor are shown below:

LOCATION ON DEEP RUN INTERCEPTOR	PROJECTED PEAK DESIGN FLOWS (MGD) ⁽¹⁾		CONTRACTED PEAK CAPACITY (MGD)
	<u>2010</u>	<u>2035</u>	
Patapsco Interceptor to Elkridge (Contract 22-S)	8.69	10.91	14.70
Elkridge to Hanover Road (Contract 181- S)	8.08	10.02	19.78
Hanover Road to Piney Run (Contract 291-S)	5.82	7.51	12.48
Piney Run to Licking Creek (Contract 291-S)	4.71	6.24	11.96

(1) – Excludes flow from Anne Arundel County

Sewer restrictions were imposed in the Patapsco service area in 1974 as a result of the limited treatment capacity of the Patapsco Wastewater Treatment Plant. With the enactment of the County's present water and sewer capacity allocation law in 1979, the lack of treatment capacity resulted in a complete moratorium on new connections. To provide relief from the moratorium, Howard County constructed a 1.0 MGD interim wastewater treatment plant located on the Deep Run tributary to the Patapsco River. All of the sewage flow in the Deep Run Interceptor at this point was diverted to the interim treatment plant. In 1983, additional capacity became available at the Patapsco Wastewater Treatment Plant. Sufficient capacity was allocated to Howard County to allow for the Deep Run Plant to be taken out of service in December, 1984. The interim plant has been maintained in a standby capacity, since then. The County completed a study of the Deep Run Plant to determine if the plant can be modified to meet the more stringent discharge limits which would be imposed by the State should the County need to reactivate the plant. It was determined that some modifications will be necessary to meet current NPDES discharge standards. Since the expansion of the Patapsco plant to 87.5 MGD capacity is completed, the Deep Run plant is currently targeted for demolition.

Presently, planned ENR (Enhanced Nutrient Removal) upgrades to the Patapsco plant may result in a reduction of plant capacity. Howard County will retain ownership of the plant site, and it is available if future need requires it.

In May, 1984, the jurisdictions contributing flows to the Patapsco Wastewater Treatment Plant entered into a Memorandum of Understanding which is included in this Plan as Exhibit 6. This memorandum specifies shares of the total design treatment capacity of the Patapsco Wastewater Treatment Plant owned by each jurisdiction. The capacity shares are as follows:

<u>JURISDICTION</u>	<u>CAPACITY SHARE (MGD)</u>
Howard County	10.0
Baltimore City	19.6
Baltimore County	34.7
Anne Arundel County	5.7

The May 1984 memorandum also describes capacity allocation procedures and the method to be used in computing future capacity allocations for each jurisdiction. Baltimore City undertook a 17.5 MGD incremental expansion of the existing facilities to a total design capacity of 87.5 MGD. The 17.5 MGD expansion completed in 1998 included the addition of a single pure oxygen activated sludge reactor to the existing process train; incorporated three primary settling tanks, one secondary clarifier, and one chlorine contact basin. Two of the primary settling tanks are to replace six old primary tanks and to provide redundancy for maintenance purposes. Biological nutrient removal was incorporated into the treatment process. Howard County's share of the incremental capacity increase was 2.4 MGD, bringing the County's total capacity share to 12.4 MGD.

The ENR upgrades to the Patapsco plant currently underway may result in a reduction of plant capacity. The planned capacity of the plant is 81 MGD. The County's total share capacity is projected to be approximately 11.4 MGD. Final capacities will be determined upon completion of the upgrades, expected in Year 2013.

Sewage Conveyance and Treatment - Patuxent Basin

The Little Patuxent Water Reclamation Plant (LPWRP) is currently the only municipal wastewater treatment facility operated by the Howard County Department of Public Works in the Patuxent Basin. The first treatment unit of the contact stabilization type with a capacity of 1 MGD was completed and put into service in November, 1965. Additional construction over the years has brought the present (2008) NPDES permitted hydraulic capacity to 25.0 MGD, with associated nutrient loading caps of 304,556 lbs of Total Nitrogen (TN) per year and 22,842 lbs of Phosphorous (TP) in the effluent per year. Upon completion of the proposed 7th addition expansion, scheduled for completion in 2012, the permitted hydraulic capacity will be 29.0 MGD. Projected demands and planned capacity for the Patuxent service area are given in Table 9. A diagram of the present treatment processes at the Little Patuxent Plant is shown in Figure 17.

The highest average daily flow to the LPWRP in 2011 (to date) was 36.74 MGD, occurring on September 9th. The highest hourly flow experienced in 2011 (to date) was 47.45 MGD, occurring at 10:00 pm on March 10th.

The Patuxent River Basin Water Quality Management Plan, prepared under Section 303 (e) of the Federal Water Pollution Control Act Amendments of 1972 by the State Water Resources Administration, includes the Little Patuxent Water Reclamation Plant as a permanent component of the region's sewage treatment facilities. The State Department of the Environment and EPA expressed concern regarding the health impacts related to an effluent discharge into the Little Patuxent River at the plant site. The intake for Fort Meade's water treatment facility is located approximately four miles downstream from the Little Patuxent Plant. The Howard County Department of Public Works evaluated several alternatives to alleviate potential health concerns in a report titled Savage Wastewater Treatment Plant Discharge Evaluation (October, 1976). The alternative recommended and implemented extended the effluent discharge to a point below the Fort Meade water intake through construction of a 54 inch diameter pipeline parallel to the Little Patuxent River. The NPDES Discharge Permit for this effluent discharge point is included as Exhibit 7. With the deactivation of the Fort Meade Water Treatment Plant, Anne Arundel County has removed the intake from service and currently relies on groundwater.

The fourth addition to the plant expanded its capacity to 15 MGD, including primary and secondary treatment, nitrification, phosphorus removal, filtration, disinfection, and sludge handling facilities.

In 1989, Howard County entered into a Phase I BNR Agreement with the Maryland Department of the Environment which required the County to implement Biological Nutrient Reduction (BNR). The fifth addition to the Little Patuxent Water Reclamation Plant, which was in response to this Phase I Agreement, was completed in 1994. This addition utilized BNR technology for both nitrogen and phosphorus removal. The facilities provide a total capacity of 20 MGD, which provided for the plant needs through Year 2005.

Howard County entered into a Phase II BNR agreement with the Maryland Department of the Environment in 1994 to determine the technical feasibility of further reductions in total nitrogen removal to a seasonal level of 3 mg/l using increased internal recycle as well as methanol addition. The results of that study as well as a demonstration scale test determined that it was not technically feasible using the methodologies described.

The sixth addition to the Little Patuxent Water Reclamation Plant was completed in 2004. This addition upgraded the hydraulic capacity of the plant to 25 MGD, and provided for additional nitrogen reduction and enhanced solids handling capability. The plant incorporated the modified Johannesburg process, which is a further refinement of the BNR process. Construction of this expansion helped further reduce the total nitrogen discharge, and enhanced the solids handling and treating ability by adding centrifuges for dewatering. This expansion provided hydraulic capacity for the sewage projection through Year 2020 in the basin including the Route 108 Pumping Station tributary.

Presently, the County is under contract for design of the Seventh (7th) Addition to the Little Patuxent Water Reclamation Plant for Enhanced Nutrient Removal (ENR) facilities to further reduce total nitrogen and phosphorous in the effluent. The County is pursuing grant opportunities with the Maryland Department of the Environment to obtain Bay Restoration Funds as well as State Revolving Loan Funds to help finance the project. Construction of these facilities is expected to be completed in 2012.

Previously, the County acquired a vacant property adjacent to the plant. This property may be utilized for any additional treatment capacity expansion or sludge management facilities beyond what can be built on the existing plant site, if needed. This property is "Parcel 165" located adjacent to the eastern boundary of the existing plant site. Figure 18 shows the location of the property.

Operation and maintenance costs at the Little Patuxent Water Reclamation Plant in fiscal year 2010 averaged \$1,473/million gallons treated for an average flow of approximately 16.9 MGD. An additional 3.0 MGD from the Patuxent Basin was pumped to the Patapsco Basin via the Route 108 Pumping Station during this period.

The Patuxent Institute for Defective Delinquents and the Clifton T. Perkins Hospital are served by sewage collection and treatment systems owned and operated by the State of Maryland. The sewage collected at the Institute is pumped to the treatment facility at the Maryland House of Correction in Jessup. The Maryland Environmental Service has constructed improvements to the Jessup Plant. The Wholesale Food Market, a state property, is provided public sewerage service by Howard County.

Several properties along Dorsey Run Road were in need of public sewerage service. Providing service to these properties using Howard County's sewer system would require construction of a sewer pumping station. In a cooperative effort with Maryland Environmental Service and the Maryland Department of Public Safety and Correctional Services, an agreement was executed in September, 1992 to allow the properties along Dorsey Road to use the nearby State sewer system, which would allow these properties to be provided gravity sewer service, eliminating the need for an expensive sewage pumping station. In exchange, Howard County agreed to construct a sewer line to divert the sewage from several State properties into the County's sewer system. By agreement, the flow diverted from the State properties to the County's sewer system will always be equal to or greater than the flow diverted from properties in the County to the State's sewer system. If necessary, the County also agreed to divert flows from the Patuxent Institute to the County's sewer system in order to maintain a balance in sewage flows diverted between the State and Howard County. Construction on this "Patuxent Diversion Sewer" has been completed, and the Patuxent Institute's flow has been diverted on a proportional basis to Howard County facilities.

Presently, there are six major interceptors flowing to the Little Patuxent Plant: the Hammond Branch, Little Patuxent, Middle Patuxent, Guilford Run, Patuxent and Dorsey Run Interceptors. The flows in the Patuxent Interceptor are pumped by the North Laurel Pump Station to the Hammond Branch Interceptor. The Hammond Branch Interceptor serves the Hammond Branch drainage basin from the Anne Arundel County boundary to Fulton. The Guilford Run Interceptor serves the area along Route 32 from Annapolis Junction to Guilford. The Guilford Interceptor also carries flows pumped from the Dorsey Run Interceptor. The Dorsey Run Interceptor serves the Greater Baltimore Food Market and vicinity and, the area parallel to and west of Route 175 from Jessup to Jonestown.

The Little Patuxent Interceptor, which extends from Savage northward to above Route 40, is the major contributor to the Little Patuxent Water Reclamation Plant. Flow in the Little Patuxent Interceptor above Route 108 can either flow by gravity downstream to the Little Patuxent Water Reclamation Plant or be diverted to the Patapsco service area by the Route 108 Pump Station. A force main from the pumping station carries the flow to the Cat Rock Run Interceptor, which is a tributary to the Patapsco Interceptor via the Tiber Branch connection. Howard County is currently allotted 15.1 MGD in the Patapsco Interceptor immediately downstream from the Tiber Branch connection, which is adequate through buildout to accommodate the Tiber Branch gravity flows plus the Rt 108 Pumping Station flows. The Rt 108 Pumping Station is used on an “as-needed” basis to reduce flows to the Little Patuxent Water Reclamation Plant during periods of construction or in order to reduce loadings. A capital project to upgrade the Rt 108 SPS was completed, which included a new flow diversion structure adjacent to the station for balancing flows, new odor control facilities, and individual variable speed drive units on each pump.

The Middle Patuxent Interceptor connects to the Little Patuxent Interceptor north of Savage. The planned service area will include the area bounded approximately by Route 108 to the north and west, Md. Route 32 to the south, and the natural drainage fall line to the east. This encompasses the Village of River Hill and areas of Clarksville. A special subdistrict of the Metropolitan District had been established for properties served by the Middle Patuxent Interceptor to recover the construction cost of the interceptor, however the special construction charge has been ended as the remaining funds are sufficient to pay off the bonds.

Deep Run Water Reclamation Plant

The Deep Run plant has been out of service and decommissioned since the mid 1980's. The plant is targeted for demolition.

Sewerage System Modeling

To identify conveyance system expansion requirements, a comprehensive hydraulic analysis was performed for all existing interceptors in both the Patapsco and Patuxent service areas as well as improvements already slated for implementation. Projected peak wastewater flows were determined for the tributary service area. Flows were developed for the design years 2010, 2015, 2020, 2025, 2030, and the projected buildout year of 2035. The full development populations and industrial/commercial acreages served were determined based on present zoning conditions within the service area, as supplied by the Howard County Department of Planning and Zoning projection figures. Full development land uses were considered as those shown in the 2000 General Plan for Howard County with approved updates.

Flows at each point were projected based on analysis of data collected during flow metering programs in 2001 and 2010 and the summarization of 2010 winter quarter water usage records. Computed flows for ultimate flow conditions in the year 2035 were compared to existing hydraulic capacity at each critical point. Available capacity was determined by simulating various flow scenarios in the XP-SWMM hydraulic modeling program and evaluating results in terms of surcharging and flooding / overflowing. Roughness coefficients utilized varied based on the hydraulic model calibration. Capacity improvements were developed based on two criteria: depth-to-diameter ratio (d/D) of 0.80 or less and flooding / overflowing. The County's preferred operational approach is to achieve a d/D ratio of 0.80 or less in all pipes included in the hydraulic model based on ultimate flow conditions (Year 2035). Implementation of the full set of hydraulic improvements identified in Table 13 will achieve this goal. In order to identify the portion of those improvements that are most critical, the hydraulic model was used to locate points in the system that would flood / overflow based on Year 2035 flows and

identify the portion of those improvements that must be implemented in order to prevent it. These improvements are included in Table 13 in the 0 – 5 year range.

Howard County is currently constructing the Little Patuxent Parallel Interceptor as part of Capital Project S-6175. An earlier study identified the need for a parallel interceptor for approximately 10.5 miles between MD Rt 108 and the LPWRP in order to meet the 2035 design flows. Projected 2035 flows have indicated that another 0.5 mile north of Rt 108 will be required to be paralleled.

Where Howard County's allocated capacity in an interceptor is established by inter-jurisdictional agreement, projected peak flows were compared with the contracted allocation. If in the future capacities are exceeded, potential problems may be addressed in one of two ways. First, a capital project may be established to provide additional conveyance capacity, possibly through an inter-jurisdictional cost sharing arrangement. Second, the existing hydraulic capacity may be re-allocated between jurisdictions. Obviously, any re-allocation would be the result of inter-jurisdictional negotiation, and would only be possible if one of the contracting parties has surplus capacity available.

The results of this hydraulic analysis served as a basis for identifying projects to be included in Table 13. Table 15A provides a comparison of projected peak wastewater flows with interceptor capacities at critical locations.

Projections to Year 2035 are used for analysis in the Master Plan since development and population projections are prepared by the Department of Planning and Zoning out to Year 2035 which is considered ultimate build-out. Once the full set of system hydraulic improvements were determined, they were further categorized to differentiate between ones needed in order to prevent flooding / overflowing versus those needed in order to achieve a depth-to-diameter ratio (d/D) of 0.80 or less. Improvements needed in order to prevent flooding / overflowing were assigned to the 0 – 5 year range whereas all others were assigned to the 6 - 10 year range. For the improvements slated for implementation in the beyond 5 year range, other factors should be taken into consideration in order to determine prioritization such as the following:

1. Present worth analysis, comparing the cost of phased implementation (construction of parallel interceptors, incremental pump station expansion, etc.) with the cost of a facility initially providing capacity for ultimate development.
2. System hydraulics, considering such factors as minimum allowable flow velocities, differences in pump or pipe sizes required for ultimate flows, etc.
3. System reliability, considering the advisability of having parallel facilities to provide for limited flow capacity during maintenance or repair periods.
4. Construction limitations, considering the difficulties involved with constructing parallel facilities after initial construction is complete.
5. System design life, considering the useful life of the facility.

Where a proposed facility will be grant funded, sizing is determined based on regulations which must be followed to maintain grant eligibility. Pipe sizes are listed in Table 13 or on the Sewerage Facilities Map (Exhibit 10) but should be considered preliminary. This is because pipe sizes depend on the topography in the project area that is not known with certainty until the specific pipe alignment is determined and topographic surveys are performed. Pipe sizes will be determined at the time of design considering the flow projections given in this Plan.

Table 15 summarizes treatment plant flow data in the Patapsco and Patuxent service areas. Table 17 provides a listing of all sewage pump stations currently in operation and proposed in each service area.

Required Local System Improvements

In the Little Patuxent Water Reclamation Plant drainage area, the improvements needed to provide adequate capacity for future flows are listed below by sub-drainage area.

Little Patuxent: No additional hydraulic improvements needed beyond the Little Patuxent Parallel Interceptor which is already under construction.

Route 108: Extension of Little Patuxent Parallel Interceptor to a point upstream of Route 108 Pump Station needed to address hydraulic deficiencies.

Middle Patuxent: No hydraulic improvements needed.

Hammond Branch: Hydraulic improvements needed on the bottom-most portion of the Hammond Branch Interceptor and the full length of the HB1A-branch. The vast majority of the Hammond Branch Interceptor and all of its branches, except HB1A-, have adequate capacity. Only the bottom-most section of the Hammond Branch Interceptor and the full length of the HB1A- Interceptor require supplemental capacity. The HB1A- branch receives flow from the North Laurel Pumping Station which currently has insufficient capacity, but already is already slated for replacement with a new pumping station with greater capacity. As a result, the increased capacity is greater than the capacity currently available in the gravity line receiving flow from the pumping station and requires additional supplemental capacity. The HB1A- branch ties in near the bottom of the Hammond Branch Interceptor and contributes to its need for additional capacity. The Hammond Branch Interceptor requires additional supplemental capacity from a point a short distance upstream of the HB1A- branch tie-in to the Little Patuxent Water Reclamation Plant.

North Laurel: Hydraulic improvements needed to the Patuxent Interceptor plus NL1A- and NL1AA branches. The Patuxent Interceptor is the main sewer flowing to the North Laurel Pumping Station. It has one major branch NL1A- located approximately halfway up the length of the Patuxent Interceptor which also subdivides into the NL1AA branch. Both the NL1A- and NL1AA branches require supplemental capacity, as does the Patuxent Interceptor from the point at which the NL1A- branch connects to the North Laurel Pumping Station.

Guilford Run: Hydraulic improvements needed to GR1A- branch and GR1B- branch. No improvements are needed on main interceptor. GR1A- branch which receives flow from the Henkel's Lane / Annapolis Junction Pumping

Station requires supplemental capacity. GR1B- branch which receives flow from the Dorsey Run Pumping Station requires supplemental capacity only for short section at the upstream end where the Dorsey Run Pumping Station force main connects to a short distance downstream.

Dorsey Run: Hydraulic improvements needed to Dorsey Run Interceptor and DO1A- branch. The Dorsey Run Interceptor is the main sewer flowing to the Dorsey Run Pumping Station. Supplemental capacity is needed for approximately the bottom half of the Dorsey Run Interceptor and approximately the bottom half of the DR1A- branch. In addition to the supplemental capacity needed, the bottom portion of the existing Dorsey Run Interceptor needs to be re-configured in order to remove the nearly 180-degree bend in the existing interceptor that contributes to surcharging up the Dorsey Run Interceptor.

In the Patapsco Wastewater Treatment Plant drainage area, the improvements needed to provide adequate capacity for future flows are listed below by sub-drainage area.

Patapsco Interceptor: Not applicable due to being under responsibility of Baltimore County.

Patapsco – Sucker Branch: Hydraulic improvements needed to Sucker Branch PA1H- Interceptor. Various segments of the existing interceptor have been paralleled over the years. However, the earlier paralleling efforts did not encompass the full length of the interceptor and in some cases the parallel added was not large enough to provide the capacity needed. As a result, supplemental capacity is needed for most of the length of the Sucker Branch Interceptor.

Patapsco – Ellicott City: Hydraulic improvements needed to Tiber Branch PA1G- Interceptor in upper reaches and replacement of billing meter. There are three 12” or larger interceptors that converge in Ellicott City prior to flowing through the billing meter and connecting to the Patapsco Interceptor. The PA1G- Interceptor which receives flow from the Route 40 Pumping Station needs supplemental capacity for most of its length, although only upstream of the portion located in Main Street of Ellicott City, which has severe slopes that provided

adequate capacity. Although the main PA1G- Interceptor in Main Street has adequate capacity, the billing meter at the bottom constricts flow too greatly and requires replacement and reconfiguration. The PA1GB Interceptor which receives flow from the Route 108 Pumping Station needs supplemental capacity during the Year 2010 simulations, but not future simulations since the Route 108 Pumping Station is scheduled to be taken offline so no improvements are needed for it. The County may wish to operate the Route 108 Pumping Station in the future in case of emergency at the Little Patuxent Water Reclamation Plant which could warrant the need for diverting flow away from it. If so, the branch receiving the flow from the Route 108 Pumping Station would require some supplemental capacity.

Patapsco – Bonnie Branch: Hydraulic improvements needed to Bonnie Branch PA1D- Interceptor and Rockburn Branch PA1DB Interceptor. The Bonnie Branch PA1D- Interceptor receives flow from Rockburn Pumping Station, which requires supplemental capacity for the full length of the Bonnie Branch Interceptor. In addition, the PA1DB interceptor flowing to the Rockburn Pumping Station also requires supplemental capacity for nearly the entire length.

Deep Run Interceptor: Hydraulic improvements needed to Deep Run Interceptor. The bottom portion of the Deep Run Interceptor following the Howard County / Anne Arundel County border has adequate capacity and requires no improvements. Upstream of that portion, the Deep Run Interceptor requires supplemental capacity for most of its remaining length.

Deep Run Inverted Siphon – Installation of the 3rd Barrel is necessary and is currently under design.

Deep Run – Elkridge: Hydraulic improvements needed to Furnace Avenue DR1A- Interceptor. The Furnace Avenue DR1A- Interceptor in Elkridge already has improvements for the bottom section slated for implementation. However, these improvements do not extend far enough upstream to address the insufficient capacity and need to be extended for most of its length.

Deep Run – Shallow Run: Hydraulic improvements needed to Shallow Run DR1B- Interceptor and a portion of the DR1BC branch. The main part of the

Shallow Run DR1B- Interceptor where it receives flow from other interceptors needs supplemental capacity as well as a small section of the DR1BC Interceptor which connects to it.

In both the evaluation of existing capacity and the design of new pumping station facilities, the pumps and their accompanying force mains are considered to comprise single comprehensive systems. In other words, pumping stations identified as requiring additional capacity may require improvements to the force main, as well as the pump station itself.

Route 108 Pumping Station: Not applicable as the pump station will no longer be needed once the remaining sections of the Little Patuxent Parallel Interceptor are constructed which is scheduled for 2012.

North Laurel Pumping Station: No hydraulic improvements needed beyond the replacement already designed.

Dorsey Run Pumping Station: Additional capacity of 3.555 mgd needed.

Henkel's Lane / Annapolis Junction Pumping Station: No hydraulic improvements needed.

Route 40 Pumping Station: No hydraulic improvements needed.

Rockburn Pumping Station: Additional capacity of 0.371 mgd needed.

Meadowridge Pumping Station: No hydraulic improvements needed.

Old Landing Pumping Station: No hydraulic improvements needed.

Table 13 provides a complete listing of proposed sewerage facilities projects in the 0 to 5 Year, 6 to 10 Year and Comprehensive Plan categories. The existing and proposed sewerage facilities are shown on the map at the end of this chapter.

Biosolids Disposal

Biosolids are currently generated by private septic systems and shared sewage disposal facilities throughout the County and at the Little Patuxent Water Reclamation Plant. Septic tank biosolids are collected by private haulers and haulers under contract to the County who dispose of it for treatment at the Little Patuxent Plant.

Sewage biosolids are currently thickened at the Little Patuxent Water Reclamation Plant by dissolved air flotation and gravity thickening. The thickened biosolids are dewatered by centrifuge to a density of approximately 25 percent solids. The dewatered biosolids are lime stabilized or pasteurized to a Class A product. The stabilized biosolids are then disposed of by one of two methods: as a soil conditioner through land application or landfill performed by a company under contract to the County.

Reliability of a land application program is dependent on the availability of application sites, which is in turn a function of landowner perception of the program, cropping practices, regulatory constraints, and the amount of undeveloped land available.

The contractor is responsible for locating sites for land spreading the stabilized biosolids. The contractor may at its option haul biosolids to a landfill outside of Howard County for disposal.

A comprehensive biosolids management study was completed in 2006. The study evaluated biosolids treatment and disposal options in order to identify the long term approach best suited for the Little Patuxent Plant. It recommends continued reliance on land application with landfilling as a standby option. The biosolids processing train would consist of gravity thickening of primary solids, flotation thickening of waste activated biosolids, blending the two thickened solids, dewatering with centrifuges, and lime stabilization or pasteurization. The construction of the biosolids treatment facilities at the Plant is complete, as part of the sixth edition improvements. The seventh addition improvements, scheduled for completion in 2012, will add a third centrifuge to augment the present two (2). The County is preparing to undertake a new biosolids study in order to determine the best alternative for either land application, incineration, soil blending, landfilling, or other alternatives based the newest available technologies, revised MDE regulations, and best cost options. The study is planned for Fiscal Year 2013.

Table 15 presents the estimated tonnage of biosolids generated and Table 15A summarizes biosolid treatment and disposal information for the Little Patuxent Plant. Currently the Maryland Department of the Environment (MDE) is updating the regulations specific to biosolids. Redrafting of the regulations by MDE may result in significant fee increases with little incentive for sludge treatment to Class A levels; and production Class B levels may be the final result.

Reclaimed Water System

While MDE contemplates new regulations concerning the use of Class IV effluent, the Howard County Bureau of Utilities is taking initial steps toward implementing a County-wide reclaimed water distribution network.

Howard County has already constructed a reclaimed water line to a local manufacturer and another project is underway to provide reclaimed water to a quarry in the County. Also a reclaimed water pumping station has been constructed at the Little Patuxent Water Reclamation Plant. These projects were pursued with the expectation that Howard County would eventually implement a county-wide reclaimed water system that would be available not only to businesses, but to homeowners as well.

Howard County currently has a study underway that will culminate in a report that will serve as the master planning document for a county-wide reclaimed water system. The master planning document will contain maps showing likely pressure zones and will summarize necessary changes to the County Code including changes to County Design Manuals II and IV and changes to the current plumbing code.

The study will include the following tasks:

- Codes Review: Review local, state, and national plumbing codes as they may apply to or conflict with the conceptual reclaimed water system. A consultant will research and identify necessary changes to the Howard County Design Manual, Volume II and IV, and will review the plumbing

code of WSSC including 602 and 804 regulations to determine necessary applications or conflicts.

- **Review and Summary of Applicable MDE Guidelines:** Review the latest edition of MDE's proposed Class IV water reuse regulations and preparation of an executive summary of the proposed guidelines which may apply to the implementation of a County-wide reclaimed water system.
- **Survey of Reclaimed Water Standards:** Survey of other U.S. jurisdictions that have either implemented reclaimed water systems or are contemplating future water reuse.
- **Identification of Potential Reclaimed Water Customers:** Research potential end-users of reclaimed water throughout the County, identify general groups (e.g., golf courses, industrial and commercial users, physical plants, etc.), and then attempt to locate and quantify the number of potential users in each category plus research reclaimed water applications for potential residential customers.
- **Develop Conceptual Reclaimed Water Distribution Network:** Utilizing existing property and development shapefiles provided by Howard County Department of Planning and Zoning (DPZ), graphically display potential reclaimed water customers on a County service map. Then analyze the relative locations of potential users and develop a conceptual distribution network which may address zoning, estimated demands, pressure zones, booster pumping station and other equipment locations, storage, chemical dosage, and other appurtenances.

The study is anticipated to be completed by the end of 2012 and will be incorporated into the Master Plan as a separate chapter at the next amendment.

Septage Collection and Treatment

Fourteen percent of the population of Howard County, approximately 12,000 homes and a small number of businesses have private on-site septic systems and shared sewage disposal facilities for sewage treatment. Assuming that each septic tank in the County is emptied and cleaned by a septage hauler at three year intervals and that the volume of septage waste generated from each tank equals 1,500 gallons, the total volume of septage waste generated annually would be 6 million gallons. This estimate is probably high in that a significant fraction of septic system owners probably do not have their systems maintained at three year intervals.

Waste collected by septage haulers consists of several types. The predominant waste type is that collected from residential septic tanks. In addition, grease traps at food preparation facilities, holding tanks, and a limited amount of commercial/industrial waste are collected by septage haulers. Industrial wastes may not be discharged at County receiving facilities unless that waste complies with adopted local as well as applicable Federal pretreatment standards.

The sole designated location for disposal of septage waste in Howard County is the Little Patuxent Water Reclamation Plant. Comprehensive administrative and operational controls have been in place for several years to manage septage waste at this facility. Septage haulers desiring to discharge collected waste at the plant must obtain both an operating permit from the Howard County Health Department as well as a discharge permit from the treatment plant. The discharge permit specifies rules and conditions which must be satisfied by the septage hauler to retain permission to discharge at the plant. Haulers must maintain records of customers serviced; must maintain their equipment in good operating condition; must follow certain operational procedures while on the plant site; and must provide the County with surety (bond, deposit, etc.), which can be applied against any overdue charges or damages.

A sampling program has been implemented to collect random samples of delivered septage waste. Collected samples are routinely analyzed for parameters which will establish the strength of the waste loads. Specifically, samples are analyzed for BOD, Suspended Solids and Total Phosphorous since these parameters are critical in defining the waste strength for assessment of high strength charges. Loads are also

periodically sampled to test for other pollutants such as heavy metals. Samples may be collected of any load which appears to be industrial in nature. Haulers of industrial waste are required to obtain prior permission from the treatment plant prior to discharge. If such permission is not obtained and a load is delivered for disposal, that load may be visually inspected and sampled to insure pretreatment standards compliance.

New septage receiving facilities are currently being designed for the Little Patuxent Water Reclamation Plant. A new collection facility is being designed with rock traps, a rotary screening unit, conveyor, and a digester to process the received material. The new facilities are currently in design, with an approximate construction date of FY 2013.

Financing Sewerage Improvements

The Department of Public Works assumed the functions of the Howard County Metropolitan Commission when the County Charter was adopted in 1968. Under the Charter and existing local public laws, the following charges are authorized to finance the construction, operation, maintenance and administration of sewerage facilities:

- a. Ad Valorem Assessment
- b. Front Foot Benefit Assessment
- c. In-Aid-of-Construction Charge
- d. Sewer House Connection Fees
- e. Sewer User Charges and Surcharges
- f. Reclaimed Water User Charges
- g. Operation and Maintenance Fee, Shared Sewage Disposal Facilities

Ad Valorem Assessment - A yearly levy of \$0.08 cents per \$100 of assessed property value is made against all properties within the Metropolitan District. The assessment is a source of revenue designated to cover the cost of retiring bonds issued by the County and can be used to cover the payment of salaries and other expenses of the Department of Public Works related to the water and sewerage systems.

Front Foot Benefit Assessment - The front foot benefit assessment is levied against all properties provided with sewer service and the revenue is used for bond debt

service. The residential front foot assessment rate for FY2012 is \$1.13 per foot for the first 150 feet, \$0.85 for the next 150 feet, and \$0.42 per foot for additional footage. The commercial front foot assessment rate for sewer service is \$1.41 per foot of total frontage. Front Foot Benefit Assessments are no longer applied to capital projects funded after FY2005.

In-Aid-of-Construction Charge - This fee is applicable to all users of the sewer system and is a source of revenue designated to cover the cost to Howard County of construction or purchase of public sewer facilities which serve or will serve all properties connected to the system, whether or not these facilities are located in the County. The fee structure has been modified for Fiscal Year 2012, and is now a one-time charge based on the size of the water meter, with additional fees collected if a change in meter size is required. The current fee structure is as follows:

<u>Size of Water Meter</u>	<u>IACC Fee</u>
5/8 – 1”	\$600
1 ½”	\$4800
2”	\$7680
3”	\$16,800
4”	\$28,800
6”	\$64,800
8”	\$230,400
10”	\$336,000
12”	\$422,400

The above charges, fees, and assessments are reviewed and readopted annually by the County Council with appropriate changes.

Sewer House Connection Fees –After June 30, 2007, connections to the public sewer system are performed, under contract with the property owner, by Howard County licensed on-site utility contractors. The County charges a \$300 inspection and administration fee and holds a 10% retainer based on the estimated construction cost. Under special circumstances as approved by the Director of Public Works, a one-time charge may be used for connections to the public sewer system. This charge covers the construction of the connection from the sewer lines in the public right-of-way to the abutting property line of the property served. Under these special circumstances, an individual homeowner is charged \$4500 for a 4 inch sewer connection to a residential

property. Connections larger than 4 inches, or sewer connections for commercial properties, will continue to be performed by the Advanced Deposit Order (ADO) process.

Sewer User Charges and Surcharges - Metered water consumption is the basis for the sewer user charge. The sewer user charge rate for FY 12 is \$2.39 per unit (1 unit = 100 cubic feet), and a quarterly account user charge of \$8.60. A flat rate of \$62.61/quarter is charged to customers with sewer service but no water service. Additional surcharges are charged to non-residential sewer system users discharging wastes which exceed established concentration limits for BOD, suspended solids and phosphorus. Revenues collected recover costs incurred in the operation and maintenance of the sewerage system by the jurisdictions collecting and treating the flows generated. In addition to property owners as a source of construction revenue, the County has the following sources of funds:

1. Federal Grants
2. State Assistance
3. Chesapeake Bay Restoration Fund
4. Developer Agreements
5. Interest Income

Reclaimed Water User Charges- Reclaimed water rates are established on a volumetric basis. The FY 12 rates are as follows:

Volumetric Rate	\$0.95/ 100 cu ft	
Quarterly Account User Fee	5/8"-1" meter	\$11.26
	1 1/2" – 3" meter	\$36.33
	4" and over	\$184.71

Operation and Maintenance Fee, Shared Sewage Disposal Systems – The owner of each lot connected to a shared sewage disposal system (SSDS) shall pay the County an annual fee for the operation and maintenance of the facility. The fee consists of three funds:

- (1) a fund for the routine operation and maintenance of the SSDS
- (2) a replacement fund for the expected replacement of the SSDS
- (3) an insurance fund to cover unplanned major replacement costs

User fees are based upon the projected yearly operation and maintenance costs for each type of system. In FY12, users of systems that operate with a MDE issued discharge permit have an annual charge of \$1,100 per year, users of systems without a permit have an annual charge of \$535 per year and users of the Sheppard Manor system have an annual charge of \$6,000 per year.

State Assistance - In response to the 1987 Clean Water Act the Maryland Water Quality Revolving Loan Fund was created. The Fund is being capitalized primarily by Federal grants and matching funds from the State. The Fund is used to finance loans to local governments for municipal wastewater treatment projects and other water quality projects such as sewer interceptor construction and rehabilitation. Loans made to local governments must be paid back in full, but interest rates charged on the loans are at below market interest rates. In addition, the Water Quality Financing Administration, with monies provided under the Bay Restoration Fund Act, provides grant funding for Enhanced Nutrient Removal (ENR) upgrades to existing treatment facilities. The seventh addition to the LPWRP has qualified for grant funding for its ENR portion of the upgrade.

Developer Agreements - The Developer Agreement is a method for financing the construction of collector sewers and shared waste disposal facilities in new subdivisions. For collector sewers the developer advances the total system construction cost including engineering and administrative expenses. Prior to 2005, after connection to the system, the developer was rebated for each single-family detached residential lot fronting on and served by the sewer line constructed under the Developer Agreement, and may have recovered up to 100% of the construction costs. Rebates varied for other types of residential, commercial and industrial properties. For shared waste disposal facilities, the developer posts security guaranteeing the construction and warranty of the facilities. No rebates are applicable. After 2005, the Developer rebate program has been ended for all new subdivisions, and the developer can recover his construction costs through the price of the lot or through creation of a private water company (under Maryland State Law) to bill the costs through the users.

Refunds for major sewer facilities are covered by separate Developer Major Facility Agreements. Refunds are paid to the developer based on connections by properties served by the major sewer facilities. These refunds may be based on the In-Aid-of-Construction charges collected for each connection or a percentage of ad valorem taxes collected for properties served by the facility or any combination of these. The maximum refund paid to the developer shall not exceed 100% of the project construction cost. Agreements for major facilities are effective for 10 years after which no further refunds are paid to the developer.

Interest Income - Proceeds from bonds and revenues earmarked for construction are invested and earn interest until they are needed. Due to the irregularity of disbursements and receipts, annual interest income varies considerably.

Financial Management Plan

The Department of Public Works is responsible for operating and maintaining all public sewer facilities in Howard County. A Water and Sewer Enterprise Fund has been established to provide the funding mechanism for the operation and maintenance of the public sewer system as well as to provide financing for the retirement of debt incurred for the construction of the sewer system. This Fund is financed through the use of user charges, front foot benefit and ad valorem assessments, connection fees, in-aid-of-construction fees, and other revenue sources as shown in Schedule FS - Financial Management Statistics. Schedule FS - Financial Management Statistics provides a summary of the expenses incurred and revenues received by the County's Water and Sewer Fund for Fiscal Years 2008, 2009, and 2010.

In addition, the portion of Howard County in the Patapsco sewer service area is provided wastewater treatment services by Baltimore City at the Patapsco Wastewater Treatment Plant. Sewage from Howard County must first flow through the Patapsco Interceptor in Baltimore County before reaching the Patapsco Wastewater Treatment Plant. Howard County has several sewer service agreements with Baltimore County which provide the mechanism for Howard County to pay for these wastewater

conveyance and treatment services. Baltimore County, in turn, has similar agreements with Baltimore City.

SCHEDULE FS
FINANCIAL MANAGEMENT STATISTICS
COUNTY WATER AND SEWER PLANS

County Name: Howard County

System Name: Patuxent/Patapsco

Fiscal Year #1 FY 08

Fiscal Year #2 FY 09

Fiscal Year #3 FY 10

A: FISCAL YEAR (Combined W&S)	FY 08	FY 09	FY 10
B: User (W&S) charge revenue	\$32,745,477	\$37,552,428	\$39,899,112
C: Misc Sales	\$763,933	\$471,271	\$538,748
D: Total Operating Revenue	\$33,509,410	\$38,023,699	\$40,437,860
E: Other revenue (see page 2)	\$25,403,577	\$30,466,011	\$28,736,558
F: Total revenue	\$58,912,987	\$68,489,710	\$69,174,418
G: Operations expense	\$7,167,121	\$7,535,960	\$8,343,498
H: Maintenance expense	\$7,167,121	\$7,535,960	\$8,343,498
I: Replacement expense	\$7,167,121	\$7,535,960	\$8,343,498
J: Fees paid to other jurisdictions	\$14,374,346	\$16,930,136	\$18,287,658
K: Total OM & R(1)	\$35,875,708	\$39,538,016	\$43,318,152
L: Interest expense(2)	\$6,752,685	\$6,832,838	\$7,947,058
M: Depreciation expense	\$18,319,953	\$12,304,252	\$13,634,123
N: Total expense	\$60,948,347	\$58,675,106	\$64,899,333
O: Increase(Decrease)	\$(2,035,360)	\$9,814,604	\$4,275,085
P: Debt principal(2)	\$199,353,338	\$205,208,343	\$205,403,253
Q: Total flow volume(combined W&S, MG)	17,085	17,681	18,702

Note: Source: Comprehensive Annual Financial Report (CAFR)

R: Extraordinary repairs and maintenance are those which are of such a nature as to be beyond those in the annual budget. Examples of "extraordinary" breakdowns might include a blower breakdown in the aeration system, large pump system motor and control, clarifier sludge scraper arm and bearings, or a floating aerator. Please identify the most costly potential repair and maintenance problem for this sewerage system.

Howard County operates only one wastewater treatment plant - Little Patuxent Water Reclamation Plant - which has a design capacity of 25.0 million gallons per day and provides biological nutrient removal treatment. As such any of the examples of an "extraordinary" repair mentioned above and others could apply. It is not practical, for a plant of this nature, to project what may be the single most costly repair and maintenance problem. Howard County purchases 100% of its water from Baltimore City and WSSC.

S: Approximate cost of (extraordinary) repair: Up to \$100,000 per Event

T: Describe the source of funds to cover this extraordinary item (a bond, line of credit, escrow account, working capital, etc.)

The cost of these items are covered by surpluses in the existing budget.

U: Additional comments:

Due the nature of the budgeting process in Howard County it is not feasible to precisely separate all the revenues and expenses incurred in the operation of the County's public water system from those associated with the operation of the public sewer system. Therefore, for the purposes of this report, combined revenues and expenses have been shown equally based on the cost of operation, maintenance, and replacement for the County's public water and sewer system.

V: Detail of other revenue on line E (if applicable):

	Year 2008	Year 2009	Year 2010
Non-Operating Revenues	Amount	Amount	Amount
Ad Valorem	\$23,386,096	\$30,981,090	\$32,395,314
Interest on Investment	\$2,507,157	\$1,157,236	\$370,615
Other	\$2,982,830	\$957,080	\$(165,696)
Water/Sewer assessment charges	\$3,280,179	\$4,203,443	\$4,082,983
Interest Expenses	\$(6,752,685)	\$(6,832,838)	\$(7,947,058)
Total	\$25,403,577	\$30,466,011	\$28,736,558

Capacity (water) 41.5 MGD (sewer) 41.4 MGD Contact Person Name: Jeffrey K. Welty

Users (2011): residential 70,000
commercial 4000

Address: Howard County, Bureau of Utilities
8250 Old Montgomery Road
Columbia, MD 21045

User Rates & Fees (2011):

Telephone No.: (410) 313-4900

Water a) Winter Rate = 1.49/100 cu ft
b) Summer Rate = \$ 1.66/100 cu ft

Wastewater = \$2.39/100 cu ft

CHAPTER 4

TABLES AND FIGURES

Table 9

Projected Sewer Flows and Capacities

Service Area	Household Population			Average Flow (MGD)		Available or Planned Treatment capacity (MGD)
	Total	Unserved	Served			
2015						
NPS + AR	43,098	43,098	0			
Patuxent	143,510		143,510	18.99	22.84	29.00
108 PS	39,260		39,260	3.85		
Patapsco	69,813		68,299	5.80		12.40
Total	295,681	43,098	252,583	28.64		41.40
2020						
NPS + AR	44,718	44,718	0			
Patuxent	148,154		148,154	19.70	23.80	29.00
108 PS	41,949		41,949	4.09		
Patapsco	75,061		68,299	6.22		12.40
Total	309,883	44,718	265,164	30.01		41.40
2025						
NPS + AR	46,162	46,162	0			
Patuxent	152,388		152,388	20.32	24.47	29.00
108 PS	42,544		42,544	4.15		
Patapsco	78,413		68,299	6.50		12.40
Total	319,507	46,162	273,345	30.97		41.40
2030						
NPS + AR	48,555	48,555	0			
Patuxent	156,607		156,607	20.81	24.96	29.00
108 PS	42,544		42,544	4.15		
Patapsco	79,082		68,299	6.56		12.40
Total	326,788	48,555	278,232	31.52		41.40
2035						
NPS + AR	50,412	50,412	0			
Patuxent	158,911		158,911	21.05	25.20	29.00
108 PS	42,544		42,544	4.15		
Patapsco	79,496		68,299	6.58		12.40
Total	331,363	50,412	280,951	31.78		41.40

NPS=No Planned Service

Revised March 2012

AR= Alpha Ridge

**TABLE 9A
FLOW PROJECTIONS BY DRAINAGE AREA (MGD)**

2010

Location Code	Subdrainage Area	Population Served	Average Residential Flow ¹	Industrial Commercial Acres	Average Industrial Commercial Flow ²	Average I&I Flow ³	Total Average Flow
DO	DORSEY RUN PUMPING STATION	8,403	0.55	1,143	0.42	0.46	1.44
GR1	GUILFORD RUN (LP WRP)	6,152	0.40	1,060	0.27	0.32	0.98
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	6	0.00	333	0.37	0.18	0.56
HB	HAMMOND BRANCH	15,418	0.89	488	0.27	0.55	1.70
LP	LITTLE PATUXENT	68,559	4.69	1,558	1.25	2.82	8.75
MP	MIDDLE PATUXENT	27,899	2.09	759	0.21	1.09	3.39
NL	NORTH LAUREL PUMPING STATION	10,760	0.64	53	0.05	0.33	1.02
PS	RT 108 PUMPING STATION	36,865	2.13	322	0.33	1.17	3.63
	Total Patuxent	174,062	11.38	5,717	3.17	6.92	21.47
BB1	BONNIE BRANCH (METER)	5,576	0.29	3	0.00	0.07	0.36
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3,603	0.19	0	0.00	0.04	0.24
DP1	DEEP RUN (FURNACE AVENUE METER)	16,408	0.90	712	0.26	0.26	1.43
DP2	DEEP RUN (ELKRIDGE)	2,329	0.13	62	0.02	0.03	0.19
DP3	DEEP RUN (SHALLOW RUN)	12,419	0.69	563	0.11	0.18	0.99
DP4	DEEP RUN (MEADOWRIDGE P.S.)	1,450	0.08	116	0.03	0.02	0.13
DP5	DEEP RUN (MONTEVIDEO METER)	97	0.00	231	0.04	0.01	0.05
PP	PATAPSCO PARK	238	0.00	7	0.00	0.00	0.00
SB	SUCKER BRANCH (SYLVAN METER)	13,543	0.79	143	0.16	0.21	1.16
TB1	TIBER BRANCH (MAIN ST. METER)	7,307	0.40	110	0.14	0.12	0.67
TB2	TIBER BRANCH (RT 40 P.S.)	1,886	0.11	46	0.05	0.04	0.20
	Total Patapsco	64,857	3.60	1,993	0.81	0.99	5.40
	Total in PSA	238,919	14.98	7,710	3.98	7.91	26.88

Notes:

Rev 3/12

- Ave Residential Flow (gcpd) is based on existing residential use summarized by flow meter drainage area and DPZ population projections.
- Ave Industrial Commercial Flow is based on existing use plus the incremental acreage provided by DPZ multiplied by 728 gpad for Commercial and 251 gpad for Industrial.
- I/I Contribution is based on the July 2010 Allocation Report comparison of metered flows versus billed water usage as follows:
PATUXENT = 68% of Total Average Flow attributed to Water Usage
PATAPSCO = 82% of Total Average Flow attributed to Water Usage

**TABLE 9A
FLOW PROJECTIONS BY DRAINAGE AREA (MGD)**

2015

Location Code	Subdrainage Area	Population Served	Average Residential Flow ¹	Industrial Commercial Acres	Average Industrial Commercial Flow ²	Average I&I Flow ³	Total Average Flow
DO	DORSEY RUN PUMPING STATION	9,013	0.59	1,231	0.47	0.50	1.56
GR1	GUILFORD RUN (LP WRP)	6,323	0.41	1,104	0.29	0.33	1.03
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	745	0.25	336	0.38	0.30	0.93
HB	HAMMOND BRANCH	18,194	1.04	594	0.34	0.66	2.04
LP	LITTLE PATUXENT	69,808	4.78	1,585	1.26	2.87	8.91
MP	MIDDLE PATUXENT	28,607	2.14	769	0.22	1.12	3.48
NL	NORTH LAUREL PUMPING STATION	10,821	0.64	65	0.06	0.33	1.03
PS	RT 108 PUMPING STATION	39,260	2.27	344	0.34	1.24	3.85
	Total Patuxent	182,770	12.12	6,028	3.35	7.36	22.84
BB1	BONNIE BRANCH (METER)	6,091	0.31	3	0.00	0.07	0.38
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3,787	0.20	0	0.00	0.05	0.25
DP1	DEEP RUN (FURNACE AVENUE METER)	19,036	1.06	795	0.29	0.30	1.66
DP2	DEEP RUN (ELKRIDGE)	3,064	0.18	68	0.02	0.04	0.24
DP3	DEEP RUN (SHALLOW RUN)	12,901	0.72	593	0.13	0.19	1.03
DP4	DEEP RUN (MEADOWRIDGE P.S.)	1,421	0.08	119	0.03	0.02	0.13
DP5	DEEP RUN (MONTEVIDEO METER)	96	0.00	262	0.04	0.01	0.06
PP	PATAPSCO PARK	418	0.00	7	0.00	0.00	0.00
SB	SUCKER BRANCH (SYLVAN METER)	13,800	0.80	153	0.16	0.22	1.18
TB1	TIBER BRANCH (MAIN ST. METER)	7,346	0.41	117	0.15	0.12	0.68
TB2	TIBER BRANCH (RT 40 P.S.)	1,854	0.11	46	0.05	0.04	0.20
	Total Patapsco	69,813	3.86	2,163	0.89	1.06	5.80
	Total in PSA	252,583	15.98	8,191	4.24	8.43	28.64

Notes:

Rev 3/12

- Ave Residential Flow (gcpd) is based on existing residential use summarized by flow meter drainage area and DPZ population projections.
- Ave Industrial Commercial Flow is based on existing use plus the incremental acreage provided by DPZ multiplied by 728 gpad for Commercial and 251 gpac for Industrial.
- I/I Contribution is based on the July 2010 Allocation Report comparison of metered flows versus billed water usage as follows:
PATUXENT = 68% of Total Average Flow attributed to Water Usage
PATAPSCO = 82% of Total Average Flow attributed to Water Usage

**TABLE 9A
FLOW PROJECTIONS BY DRAINAGE AREA (MGD)**

2020

Location Code	Subdrainage Area	Population Served	Average Residential Flow ¹	Industrial Commercial Acres	Average Industrial Commercial Flow ²	Average I&I Flow ³	Total Average Flow
DO	DORSEY RUN PUMPING STATION	9,119	0.60	1,302	0.49	0.52	1.61
GR1	GUILFORD RUN (LP WRP)	6,704	0.44	1,147	0.31	0.36	1.11
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	730	0.25	336	0.38	0.30	0.92
HB	HAMMOND BRANCH	20,291	1.16	714	0.42	0.75	2.33
LP	LITTLE PATUXENT	70,647	4.84	1,650	1.29	2.92	9.05
MP	MIDDLE PATUXENT	29,293	2.21	794	0.23	1.16	3.59
NL	NORTH LAUREL PUMPING STATION	11,371	0.68	82	0.07	0.35	1.10
PS	RT 108 PUMPING STATION	41,949	2.39	429	0.39	1.32	4.09
	Total Patuxent	190,103	12.55	6,454	3.57	7.67	23.80
BB1	BONNIE BRANCH (METER)	6,883	0.32	8	0.01	0.07	0.41
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3,894	0.21	0	0.00	0.05	0.26
DP1	DEEP RUN (FURNACE AVENUE METER)	21,736	1.22	937	0.33	0.35	1.90
DP2	DEEP RUN (ELKRIDGE)	3,267	0.19	72	0.02	0.05	0.26
DP3	DEEP RUN (SHALLOW RUN)	13,185	0.73	614	0.13	0.19	1.06
DP4	DEEP RUN (MEADOWRIDGE P.S.)	1,419	0.08	129	0.03	0.02	0.13
DP5	DEEP RUN (MONTEVIDEO METER)	94	0.00	268	0.04	0.01	0.06
PP	PATAPSCO PARK	654	0.00	7	0.00	0.00	0.00
SB	SUCKER BRANCH (SYLVAN METER)	14,529	0.85	175	0.18	0.23	1.26
TB1	TIBER BRANCH (MAIN ST. METER)	7,551	0.42	118	0.15	0.13	0.69
TB2	TIBER BRANCH (RT 40 P.S.)	1,849	0.11	46	0.05	0.04	0.20
	Total Patapsco	75,061	4.11	2,374	0.96	1.14	6.22
	Total in PSA	265,164	16.66	8,828	4.54	8.81	30.01

Notes:

Rev 3/12

- Ave Residential Flow (gcpd) is based on existing residential use summarized by flow meter drainage area and DPZ population projections.
- Ave Industrial Commercial Flow is based on existing use plus the incremental acreage provided by DPZ multiplied by 728 gpad for Commercial and 251 gpac for Industrial.
- I/I Contribution is based on the July 2010 Allocation Report comparison of metered flows versus billed water usage as follows:
PATUXENT = 68% of Total Average Flow attributed to Water Usage
PATAPSCO = 82% of Total Average Flow attributed to Water Usage

**TABLE 9A
FLOW PROJECTIONS BY DRAINAGE AREA (MGD)**

2025

Location Code	Subdrainage Area	Population Served	Average Residential Flow ¹	Industrial Commercial Acres	Average Industrial Commercial Flow ²	Average I&I Flow ³	Total Average Flow
DO	DORSEY RUN PUMPING STATION	9,576	0.62	1,342	0.50	0.54	1.66
GR1	GUILFORD RUN (LP WRP)	7,788	0.51	1,199	0.33	0.40	1.24
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	715	0.24	350	0.38	0.30	0.92
HB	HAMMOND BRANCH	21,682	1.26	813	0.47	0.83	2.56
LP	LITTLE PATUXENT	71,378	4.90	1,687	1.32	2.96	9.17
MP	MIDDLE PATUXENT	29,533	2.23	794	0.23	1.17	3.63
NL	NORTH LAUREL PUMPING STATION	11,715	0.70	106	0.07	0.37	1.14
PS	RT 108 PUMPING STATION	42,544	2.39	473	0.42	1.34	4.15
	Total Patuxent	194,931	12.85	6,762	3.73	7.89	24.47
BB1	BONNIE BRANCH (METER)	7,223	0.33	8	0.01	0.08	0.41
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3,939	0.21	0	0.00	0.05	0.26
DP1	DEEP RUN (FURNACE AVENUE METER)	23,134	1.29	1,026	0.36	0.37	2.02
DP2	DEEP RUN (ELKRIDGE)	4,021	0.23	88	0.03	0.06	0.31
DP3	DEEP RUN (SHALLOW RUN)	13,540	0.75	670	0.15	0.20	1.10
DP4	DEEP RUN (MEADOWRIDGE P.S.)	1,420	0.08	139	0.04	0.03	0.14
DP5	DEEP RUN (MONTEVIDEO METER)	92	0.00	274	0.05	0.01	0.06
PP	PATAPSCO PARK	803	0.00	7	0.00	0.00	0.00
SB	SUCKER BRANCH (SYLVAN METER)	14,607	0.85	200	0.20	0.24	1.28
TB1	TIBER BRANCH (MAIN ST. METER)	7,793	0.43	118	0.15	0.13	0.71
TB2	TIBER BRANCH (RT 40 P.S.)	1,841	0.11	46	0.05	0.04	0.20
	Total Patapsco	78,413	4.27	2,576	1.04	1.19	6.50
	Total in PSA	273,345	17.12	9,338	4.77	9.08	30.97

Notes:

Rev 3/12

- Ave Residential Flow (gcpd) is based on existing residential use summarized by flow meter drainage area and DPZ population projections.
- Ave Industrial Commercial Flow is based on existing use plus the incremental acreage provided by DPZ multiplied by 728 gpad for Commercial and 251 gpad for Industrial.
- I/I Contribution is based on the July 2010 Allocation Report comparison of metered flows versus billed water usage as follows:
PATUXENT = 68% of Total Average Flow attributed to Water Usage
PATAPSCO = 82% of Total Average Flow attributed to Water Usage

**TABLE 9A
FLOW PROJECTIONS BY DRAINAGE AREA (MGD)**

2030

Location Code	Subdrainage Area	Population Served	Average Residential Flow ¹	Industrial Commercial Acres	Average Industrial Commercial Flow ²	Average I&I Flow ³	Total Average Flow
DO	DORSEY RUN PUMPING STATION	9,871	0.64	1,378	0.51	0.55	1.70
GR1	GUILFORD RUN (LP WRP)	7,904	0.52	1,201	0.33	0.40	1.25
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	715	0.24	350	0.38	0.30	0.92
HB	HAMMOND BRANCH	23,155	1.36	859	0.51	0.89	2.75
LP	LITTLE PATUXENT	73,470	5.04	1,687	1.32	3.03	9.39
MP	MIDDLE PATUXENT	29,681	2.24	794	0.23	1.18	3.65
NL	NORTH LAUREL PUMPING STATION	11,811	0.70	112	0.08	0.37	1.15
PS	RT 108 PUMPING STATION	42,544	2.39	473	0.42	1.34	4.15
	Total Patuxent	199,150	13.14	6,852	3.77	8.05	24.96
BB1	BONNIE BRANCH (METER)	7,223	0.33	8	0.01	0.08	0.41
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3,939	0.21	0	0.00	0.05	0.26
DP1	DEEP RUN (FURNACE AVENUE METER)	23,645	1.30	1,033	0.37	0.37	2.04
DP2	DEEP RUN (ELKRIDGE)	4,038	0.23	88	0.03	0.06	0.31
DP3	DEEP RUN (SHALLOW RUN)	13,680	0.76	781	0.18	0.21	1.15
DP4	DEEP RUN (MEADOWRIDGE P.S.)	1,420	0.08	139	0.04	0.03	0.14
DP5	DEEP RUN (MONTEVIDEO METER)	92	0.00	274	0.05	0.01	0.06
PP	PATAPSCO PARK	803	0.00	7	0.00	0.00	0.00
SB	SUCKER BRANCH (SYLVAN METER)	14,607	0.85	200	0.20	0.24	1.28
TB1	TIBER BRANCH (MAIN ST. METER)	7,793	0.43	118	0.15	0.13	0.71
TB2	TIBER BRANCH (RT 40 P.S.)	1,841	0.11	46	0.05	0.04	0.20
	Total Patapsco	79,082	4.29	2,695	1.07	1.20	6.56
	Total in PSA	278,232	17.43	9,547	4.84	9.25	31.52

Notes:

Rev 3/12

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- Ave Industrial Commercial Flow is based on existing use plus the incremental acreage provided by DPZ multiplied by 728 gpad for Commercial and 251 gpac for Industrial.
- I/I Contribution is based on the July 2010 Allocation Report comparison of metered flows versus billed water usage as follows:
PATUXENT = 68% of Total Average Flow attributed to Water Usage
PATAPSCO = 82% of Total Average Flow attributed to Water Usage

**TABLE 9A
FLOW PROJECTIONS BY DRAINAGE AREA (MGD)**

2035

Location Code	Subdrainage Area	Population Served	Average Residential Flow ¹	Industrial Commercial Acres	Average Industrial Commercial Flow ²	Average I&I Flow ³	Total Average Flow
DO	DORSEY RUN PUMPING STATION	9,871	0.64	1,378	0.51	0.55	1.70
GR1	GUILFORD RUN (LP WRP)	7,904	0.52	1,201	0.33	0.40	1.25
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	715	0.24	350	0.38	0.30	0.92
HB	HAMMOND BRANCH	23,667	1.39	859	0.51	0.90	2.80
LP	LITTLE PATUXENT	75,158	5.16	1,687	1.32	3.08	9.57
MP	MIDDLE PATUXENT	29,681	2.24	794	0.23	1.18	3.65
NL	NORTH LAUREL PUMPING STATION	11,915	0.71	112	0.08	0.37	1.16
PS	RT 108 PUMPING STATION	42,544	2.39	473	0.42	1.34	4.15
	Total Patuxent	201,454	13.30	6,852	3.77	8.13	25.20
BB1	BONNIE BRANCH (METER)	7,223	0.33	8	0.01	0.08	0.41
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3,939	0.21	0	0.00	0.05	0.26
DP1	DEEP RUN (FURNACE AVENUE METER)	24,060	1.32	1,033	0.37	0.38	2.06
DP2	DEEP RUN (ELKRIDGE)	4,038	0.23	88	0.03	0.06	0.31
DP3	DEEP RUN (SHALLOW RUN)	13,680	0.76	781	0.18	0.21	1.15
DP4	DEEP RUN (MEADOWRIDGE P.S.)	1,420	0.08	139	0.04	0.03	0.14
DP5	DEEP RUN (MONTEVIDEO METER)	92	0.00	274	0.05	0.01	0.06
PP	PATAPSCO PARK	803	0.00	7	0.00	0.00	0.00
SB	SUCKER BRANCH (SYLVAN METER)	14,607	0.85	200	0.20	0.24	1.28
TB1	TIBER BRANCH (MAIN ST. METER)	7,793	0.43	118	0.15	0.13	0.71
TB2	TIBER BRANCH (RT 40 P.S.)	1,841	0.11	46	0.05	0.04	0.20
	Total Patapsco	79,496	4.30	2,695	1.07	1.21	6.58
	Total in PSA	280,951	17.61	9,547	4.84	9.33	31.78

Notes:

Rev 3/12

- Ave Residential Flow (gcpd) is based on existing residential use summarized by flow meter drainage area and DPZ population projections.
- Ave Industrial Commercial Flow is based on existing use plus the incremental acreage provided by DPZ multiplied by 728 gpad for Commercial and 251 gpad for Industrial.
- I/I Contribution is based on the July 2010 Allocation Report comparison of metered flows versus billed water usage as follows:
PATUXENT = 68% of Total Average Flow attributed to Water Usage
PATAPSCO = 82% of Total Average Flow attributed to Water Usage

TABLE 10**INVENTORY OF EXISTING WASTEWATER TREATMENT PLANTS**

Name and Operating Agency	Type Treatment	Plant Coordinate Location	Occupied Acres	Vacant Acres	Point of Discharge	Max. Site Capacity Secondary (MGD)	Max. Site Capacity Advanced (MGD)	Existing Capacity (MGD)	Avg. Flow (MGD)	Peak Flow (MGD)	Planned or expected Abandonment Date if Interim
Municipal (Public)											
Little Patuxent Water Reclamation Plant	BS-GR-PS-AS-NO-PR-NR-SF-CH-D-DW-CT-PA	853-470			Little Patuxent			29.0	17.2	36.0	
Sheppard Manor	SS				Shared Septic				0.0045		
Walnut Grove	SS				Shared Septic				0.033		
Industrial											
Maryland-Virginia Milk Producers	PS-O-GC-AS	837-475			Hammond Branch				0.192	0.270	
Owens Corning Fiberglas	PS	860-477			Unnamed tributary to Dorsey Run				0.0286		

TABLE 10**INVENTORY OF EXISTING WASTEWATER TREATMENT PLANTS**

Name and Operating Agency	Type Treatment	Plant Coordinate Location	Occupied Acres	Vacant Acres	Point of Discharge	Max. Site Capacity Secondary (MGD)	Max. Site Capacity Advanced (MGD)	Existing Capacity (MGD)	Avg. Flow (MGD)	Peak Flow (MGD)	Planned or expected Abandonment Date if Interim
Private, Community & Institutional											
St. Louis Catholic School	ST-ISF-CH-DC	815-495			Subsurface Discharge			.006	.003	unknown	
Villas at Cattail Creek	ST-PS-NR-PA	788-527			Subsurface Discharge				.017	.0384	
Homeland Marriottsville Senior Center	ST-ISF-CH-DC	829-531			Subsurface Discharge				.025	unknown	
Glenelg High School	BS-AE-NR	800-525			Subsurface Discharge				.025	0.050	
Western Elementary School	BS-AE-NR	805-513			Subsurface Discharge				.008	.014	
Bushy Park Elementary/Glenwood Middle/Glenwood Park Elementary School	BS-AD-AN	796-534			Subsurface Discharge				.012	.023	

TABLE 10**INVENTORY OF EXISTING WASTEWATER TREATMENT PLANTS**Key to Treatment Types

AD	Aerobic Digestion	ISF	Intermittent Sand Filter
AE	Extended Aeration	KC	Chemical Flocculation
AN	Anaerobic Digestion	L	Lagoon
AS	Activated Sludge	NO	Nitrogen Oxidation
BS	Bar Screen	NR	Nitrogen Removal
CG	Comminutor or Grinding	O	Grease Removal
CH	Hypochlorate Chlorination	OZ	Ozonation Disinfection
CIM	Clarigester	PA	Post Aeration
CT	Chemical Treatment	PR	Phosphorus Removal
D	Dechlorination (other)	PS	Primary Settling
D	Disinfection (other)	RBC	Rotating Biological Contractor
DC	Dechlorination SO ₂ gas	SB	Sand Drying Beds
DW	Sludge Dewatering – Mechanical	SD	Secondary Treatment (other)
FTH	Filters - High Capacity	SF	Polishing Sand Filter
GC	Gas Chlorination	SS	Shared Septic
GR	Grit Removal	ST	Septic Tank
I	Sewage Application to Land	TF	Trickling Filter
		UV	Ultraviolet Disinfection

TABLE 10A
SUMMARY OF EXISTING AND PLANNED PERMIT DISCHARGES

Facility	Permit #	Permit Type
Dayton Oaks / Western Elementary School	04DP3479	Groundwater Municipal
Glenelg High School WWTP	10DP3412	Groundwater Municipal
Marriotts Ridge High & Mount View Middle Schools	08DP3417	Groundwater Municipal
Bushy Park Elementary & Glenwood Middle Schools	05DP3512	Groundwater Municipal
Triadelphia Elementary & Folly Quarter Middle Schools	07DP3223	Groundwater Municipal
Tridelphia Farm, LLC	04DP3454	Groundwater Municipal
Villas At Cattail WWTP & WTP	05DP3260	Groundwater Municipal
Little Patuxent Water Reclamation Plant	06DP1421	Major Surface Municipal
Ashleigh Knolls Subdivision	06DP3102	Groundwater Municipal
Glenelg Country School	08DP3409A	Groundwater Municipal
Lisbon Shopping Plaza	09DP3405	Groundwater Municipal
Peddicord Property WWTP / Shepard Manor	05DP3506	Groundwater Municipal
Riverwood Phase II Shared Sewage Facility	06DP3544	Groundwater Municipal
Shapiro Property Subdivision	05DP3508	Groundwater Municipal
Wah Property Multiuse-Retail Sewage Facility	06DP3558	Groundwater Municipal
Walnut Creek Subdivision	06DP3538	Groundwater Municipal
Walnut Grove Shared Facility	05DP3504A	Groundwater Municipal
Western Regional Park	03DP3448A	Groundwater Municipal
Homeland Senior Living Community	03DP3435A	Groundwater Municipal
Maryland & Virginia Milk Producers Assoc.	03DP0033	Major Surface Industrial
Deep Run Treatment Plant	01DP1589	Major Surface Industrial

TABLE 10B

EXISTING AND PROPOSED SHARED SEPTIC SYSTEMS

Subdivision Name	Community	Contract No.	MDE Groundwater Permit	Gravity or Pressure Dose	Pre Treatment	Code requirement* ¹	No. of Connected Lots	MDF* ² (gpd)	ADF* ³ (gpd)	In Service Year (FY)
Ashleigh Knolls	Clarksville	50-3357, 50-3382, 50-3383	Yes: Permit renewal pending SBR construction	Pressure	No	Yes	109	32,700	16,350	1996
Brantwood	West Friendship	50-3816	No	Gravity	No	Yes	7	5,250	2,100	2001
Busy Park Elem. School, Glenwood Middle School, and Old Bushy Park Elem. School	HCPS									
Cheslea Knolls	Lisbon	50-4421	Yes	Pressure Dose	Yes	Yes	18	10,800	5,400	
Edgewood Farm	Glenwood	50-4309	No	Gravity	No	Yes	8	4,800	2,400	
Friendship Lakes	West Friendship	50-3871	No	Gravity	No	Yes	5	3,750	1,875	2002
Fulton Ridge * ⁶	Fulton	50-4293	No	Pressure	No	Yes	4	3,000	1,500	
Fulton Woods	Fulton	50-4361	No	Gravity	No	Yes	8	4,950	2,475	

TABLE 10B

EXISTING AND PROPOSED SHARED SEPTIC SYSTEMS

Subdivision Name	Community	Contract No.	MDE Groundwater Permit	Gravity or Pressure Dose	Pre Treatment	Code requirement* ¹	No. of Connected Lots	MDF* ² (gpd)	ADF* ³ (gpd)	In Service Year (FY)
Hopkins Choice* ⁴	Glenelg	50-4254	No	Pressure Dose	No	Yes	16	9,900	4,950	2011
Kogan Trust Property	Glenelg	Not applied for	No	Gravity	No	Yes	3	2,250	1,125	
Lyndonbrook* ⁴	West Friendship	50-3607	No	Gravity	No	Yes	11	6,600	3,300	1998
Maple Ridge	Cooksville	50-4046	No	Gravity	No	Yes	7	4,200	2,100	2003
Maplewood Farms	Glenwood	50-4458 50-4459	No	Pressure Dose	No	Yes	7	4,950	2,475	2011
Marriotts Ridge High and Mount View Middle Schools	HCPS									
Marty Howard Property* ⁶	Clarksville	50-4381	No	Pressure Dose	Yes	Yes	5	3,750	1,875	
Musgrove Property* ⁵	Glenelg	Board of Education Project	Yes	Pressure	Yes	Yes	31	18,600	9,300	2007
Neshawat Property* ⁶	Glenelg	50-4294	No	Gravity	Yes	Yes	4	6,000	3,000	2009

TABLE 10B**EXISTING AND PROPOSED SHARED SEPTIC SYSTEMS**

Subdivision Name	Community	Contract No.	MDE Groundwater Permit	Gravity or Pressure Dose	Pre Treatment	Code requirement*¹	No. of Connected Lots	MDF*² (gpd)	ADF*³ (gpd)	In Service Year (FY)
Northern High School and Mt. View Middle School	HCPS									
Owings Property Lot 3	Highland	50-4157	No	Gravity	No	Yes	7	4,200	2,100	2006
Owings Property Lot 5	Highland	50-4436	No	Gravity	No	Yes	7	4,200	2,100	
Paddocks East	West Friendship	50-4156	No	Gravity	Yes	Yes	8	4,950	2,475	2010
Pickett Property	Lisbon	50-4386	Yes	Pressure Dose	Yes	Yes	21	13,500	6,750	
Pindell Woods	Fulton	50-3952	No	Gravity	No	Yes	2	1,200	600	2004
Quartz Hill Estates	Glenwood	50-4460	No	Gravity	No	Yes	6	3,750	1,875	
Riggs Meadow	Cooksville	50-3606	No	Gravity	No	Yes	4	2,400	1,200	2002
Riverwood * ⁵	Ellicott City	50-4287	06-DP-3544	Pressure Dose	Yes	Yes	18	10,800	5,400	2013

TABLE 10B**EXISTING AND PROPOSED SHARED SEPTIC SYSTEMS**

Subdivision Name	Community	Contract No.	MDE Groundwater Permit	Gravity or Pressure Dose	Pre Treatment	Code requirement*¹	No. of Connected Lots	MDF*² (gpd)	ADF*³ (gpd)	In Service Year (FY)
Sheppard Manor * ⁵	Ellicott City	50-4357	05-DP-3506	Pressure Dose	Yes	Yes	11	8,250	4,125	2009
Tridelphia Crossing	Glenelg	50-4207	No	Gravity	No	Yes	8	4,800	2,400	2005
Walnut Creek * ⁵	Clarksville	50-4440 Collection 50-4441 Treatment	Yes	Pressure Dose	Yes	Yes	149	111,750	55,875	
Walnut Grove * ⁵	Clarksville	50-4330 Collection & 50-4359 Treatment	Yes	Pressure	Yes	Yes	87	65,250	32,625	2009
Willow Pond	Highland	50-4491	No	Pressure Dose	No	Yes	3	2,250	1,125	2011
Willow Ridge	Ellicott City	54-4301	No	Gravity	No	Yes	5	3,750	1,875	

*¹ – Code Requirement is to meet current Howard County requirements

*² – Maximum Daily Flow

*³ – Average Daily Flow

*⁴ – 2 separate areas

*⁵ – SBR

*⁶ – Private Units

TABLE 10C

SUMMARY OF EXISTING AND PLANNED COMMUNITY SEPTIC SYSTEMS

Facility Name	Community	Application/Permit Number	Permit or Revision Processing Status	Status / Date
Ellicott Meadows	Ellicott City	03-DP-3435	Permit Issued 2003	In operation, compliant
The Villas at Cattail Creek	Glenwood	05-DP-3260	Permit Issued, October 1, 2009	In operation, compliant

TABLE 11

PROBLEM AREAS INVENTORY - INDIVIDUAL AND COMMUNITY

Service Area	Problem Description	Location	Population ⁽¹⁾	Area (Acres) ⁽²⁾	Treatment Demand (MGD) ⁽³⁾	Planned Correction Date
Patapsco	7 overflowing septic systems	878-508 Rockburn Hill Road	21	5	.002	Comprehensive service area
Outside Planned Service Area	3 homes w/ advanced pretreatment; 1 home w/ a holding tank	Western side of Hall Shop Road, between Guilford Rd. and Simpson Rd.	21 homes	-----	-----	Outside planned service area

- (1) Population was computed by multiplying the average number of people per dwelling unit by the number of houses with failing septic systems. Assumed to equal 3.0 persons/unit.
- (2) Acreage determined by multiplying the average lot size in the area by the number of dwellings with failing septic systems.
- (3) Treatment demand determined by multiplying the population by an assumed per capita flow and with an infiltration/inflow allowance as used elsewhere in this Plan.

Table 12 has been omitted from this Report.

TABLE 13

IMMEDIATE, 5 YEAR, 10 YEAR AND COMPREHENSIVE PRIORITIES FOR SEWER SYSTEM DEVELOPMENT

Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs(\$)			Project Schedule		
				Total	PL 660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.
S-6175	0-5 Years	1360-541	A project for the study, design and construction of the Little Patuxent Parallel Interceptor.	78,230,000	-	78,230,000	2006	2009	2013
S-6189	0-5 Years ¹	1363-524	A project for the design and construction of improvements to the North Laurel Sewage Pumping Station to increase the pumping capacity of the station.	6,530,000	-	6,530,000	2004	2009	2013
S-6232	Under Const.		A project to televise sewer pipes in the County's sanitary sewer system for evidence of corrosion. This project will effect repairs area where corrosion has compromised the integrity of the system.	15,675,000	-	15,675,000	on-going	on-going	on-going
S-6237	Under Const.		A project for Howard County's participation in the cost sharing for the capital funding of the Patapsco Treatment Plant at Wagners Point and the related Patapsco Interceptor, Pump Station, and Force Main.	58,000,000	-	58,000,000	on-going	on-going	on-going
S-6245	0-5 Years	1365-531	A project to reduce nitrogen loading from the Little Patuxent Sewer Basin.	135,862,000	-	135,862,000	2008	2010	2013
S-6247	0-5 Years	1385-563	A project for the design and construction of 100 ft. of 8-inch sewer and 100 ft. of water main to serve four lots on Woodburn Avenue.	125,000	-	125,000,000	2011	2011	2012
S-6249			An appropriation is requested under this project to construct water, sewer and associated facilities in subdivisions where the developer has failed to build all facilities in accordance with the plans and Developer's Agreement.	3,600,000	-	3,600,000	on-going	on-going	on-going
S-6250			A project for study and evaluation of the County's Patapsco Sewer Service Area from the Daniels Area to the Deep Run.	1,780,000	-	1,780,000	2004	2008	2012
S-6253	0-5 Years	1349-589	A project for the design and construction of 1, 1900 ft. of sewer to serve properties on Baltimore National Pike.	1,465,000	-	1,465,000	2007	2011	2013
S-6255			A project for the study and evaluation of Hammond Branch and Guilford Run sewer service areas.	1,755,000	-	1,755,000	2008	2008	2012
S-6257	Under Const.	1341-601	A project for the design and construction of 1,400 ft. of sewer to serve eleven properties on Old Frederick Road in the vicinity of Marriottsville Road.	310,000	-	310,000	2006	2009	2012
S-6260	0-5 Years	1390-567	A project to provide sewer service to properties along Rockburn Hill Road.	3,405,000	-	3,405,000	2008	2012	2013
S-6262	Under Const.	1346-571	A project to provide water and sewer service to properties along MD Route 108 east of Eliot's Oak Road.	950,000	-	950,000	2010	2010	2012
S-6264		1365-530	FY2008 Little Patuxent Water Reclamation Plant capital repairs	16,758,000	-	16,758,000	on-going	on-going	on-going
S-6265	0-5 Years	1370-581	A project to design and construct 1,800 linear feet of sewer and 1,800 linear feet of water main to serve 8 properties on New Cut Road.	1,050,000	-	1,050,000	2012	2013	2014
S-6266	Under Const.	1357-596	A project to provide water and sewer service to 2 properties along MD Route 99 at Tiller Drive.	240,000	-	240,000	2009	2009	2012
S-6267			A project to determine the water and sewer use patterns for residential and commercial properties within the Howard County Metropolitan District.	250,000	-	250,000	2008	2008	2012
S-6268			A project to protect and stabilize sewers in areas where stream and soil erosion have compromised the integrity of the sewer system to convey wastewater to the County's treatment facilities.	7,230,000	-	7,230,000	on-going	on-going	on-going
S-6269	Under Const	1331-547	Design and installation of a sequential batch reactor wastewater treatment system for the Ashleigh Knolls Shared Septic Facility.	1,324,000	-	1,324,000	2009	2011	2012

TABLE 13

IMMEDIATE, 5 YEAR, 10 YEAR AND COMPREHENSIVE PRIORITIES FOR SEWER SYSTEM DEVELOPMENT

Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs(\$)			Project Schedule		
				Total	PL 660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.
S-6271	Under Const	1386-555	Construction of 1,000 ft. of parallel interceptor to the Deep Run interceptor between manholes 387 and 383.	1,060,000		1,060,000	2010	2012	2013
S-6273	0-5 years		Little Patuxent Interceptor Improvements	12,000,000	-	12,000,000	2011	2013	2014
S-6274	0-5 Years		Upper Little Patuxent Parallel Sewer. 2,000 ft. of parallel sewer main.	1,500,000	-	1,500,000	2015	2017	2019
S-6275	0-5 Years	1366-597	Construction of three pump stations, force mains and collector sewers serving the Daniels area. These pump stations will have capacities of 100 to 250 gpm (0.14 mgd to 0.36 mgd).	1,500,000	-	1,500,000	2013	2014	2015
S-6276	Under Const		FY 2011 sewer cleaning and television inspection maintenance	3,990,000	-	3,990,000	on-going	on-going	on-going
S-6277	0-5 Years	1369-596	Design and construction of 750 linear feet sewer in Old Frederick Road north of Howard Run Drive to serve 6 properties.	230,000	-	230,000	2014	2014	2015
S-6278	0-5 Years		Design and Construction of 550 linear feet of water main and 250 linear feet of low pressure sewer in Old Columbia Road	210,000	-	210,000	2012	2012	2013
S-6698			A project to design and construct routine sewer main extensions in the Metro District requested by landowners. 1. To serve existing dwellings in recorded residential subdivisions where sewer mains have not been constructed. 2. With existing dwellings or businesses on failing private systems as identified by the County Health Department. 3. To serve parcels with existing dwellings. These routine extensions must also meet the following: a. A written request has been made by a property owner who is without a sewer main fronting their property. b. Properties to be served must abut County or State road. c. The extension is less than 1,000 feet. d. The extension is a gravity sewer main and continue a sewer main currently in the service within the sewer shed. e. It does not require acquisition of utility easements. f. Capacity is available per section 18.122B County Code. g. The extension is supported by a least 50% of the abutting property owners.	2,500,000	-	2,500,000	on-going	on-going	on-going
S-6711			A project to provide engineering or administrative services, computer asset management, inspection, testing, inspector training, supplies and equipment including vehicles necessary for site inspection for the implementation of developer projects to make additions to the public water and sewer systems.	2,500,000	-	2,500,000	on-going	on-going	on-going
S-6811			FY 2011, A project to provide construction and inspection service to sites which do not require developer agreement but require 8" and larger sewer house connections and other sewer appurtenances.	100,000	-	100,000		2011	on-going
S-6812			FY 2012, A project to provide construction and inspection service to sites which do not require developer agreement but require 8" and larger sewer house connections and other sewer appurtenances.	100,000	-	100,000		2012	on-going
S-6861			FY 2011, A project to provide the construction of sewer house connections by the Bureau of Utilities for residential size (4" or 6") connections. These connections are made when new sewer house connection are required for lots or homes where none exists.	100,000	-	100,000		2010	on-going

TABLE 13

IMMEDIATE, 5 YEAR, 10 YEAR AND COMPREHENSIVE PRIORITIES FOR SEWER SYSTEM DEVELOPMENT

Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs(\$)			Project Schedule		
				Total	PL 660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.
S-6862			FY 2012, A project to provide the construction of sewer house connections by the Bureau of Utilities for residential size (4" or 6") connections. These connections are made when new sewer house connection are required for lots or homes where none exists.	100,000	-	100,000		2012	on-going
S-6950			A program for the reimbursement to developers for construction of water and sewer house connections to existing lots outside of their subdivision.	180,000	-	180,000	on-going	on-going	on-going
Developer Project	0-5 Years	1344-597	Construction of 2,600 ft. of interceptor to serve areas west of Turf Valley Road.						
Developer Project	6-10 Years	1390-566	Construction of two 100 gpm (0.14 mgd) pump stations and force mains in the Lawyer's Hill area to serve properties between Montgomery Road and I-95.						
Developer Project	Comprehensive	1372-579	Construction of pump stations and force main with capacities of approximate 100 gpm (0.14 mgd) to serve properties east of College Avenue.						
Developer Project	Comprehensive	1369-595	Construction of a 100 gpm (0.14 mgd) Church Lane pump station and force main to serve property north of Deerfield Road.						
	0 - 5 Years		Meadowridge Force Main Replacement - A project for the design and construction of 2,470 ft of replacement force main to provide additional capacity.						
	0 - 5 Years		Hammond / Patuxent Interceptor Improvements Phase 1 - A project for the design and construction of 8,820 ft of 8" to 36" supplemental sewers in the Hammond Branch and North Laurel areas to provide additional capacity.						
	6 - 10 Years		Hammond / Patuxent Interceptor Improvements Phase 2 - A project for the design and construction of 10,571 ft of 10" to 30" supplemental sewers in the Hammond Branch, North Laurel, and Guilford Run areas to provide additional capacity.						
	0 - 5 Years		Dorsey / Guilford Interceptor Improvements Phase 1 - A project for the design and construction of 545 ft of new 24" sewer to re-route the Dorsey Run Interceptor to remove bottlenecks.						
	6 - 10 Years		Dorsey / Guilford Interceptor Improvements Phase 2 - A project for the design and construction of 14,063 ft of 15" to 24" supplemental sewers in the Dorsey Run and Guilford Run areas to provide additional capacity.						
	0 - 5 Years		Bonnie Branch / Rockburn Interceptor Improvements Phase 1 - A project for the design and construction of 2,429 ft of 12" to 15" supplemental sewers in the Bonnie Branch area to provide additional capacity.						
	6 - 10 Years		Bonnie Branch / Rockburn Interceptor Improvements Phase 2 - A project for the design and construction of 14,284 ft of 12" to 30" supplemental sewers in the Bonnie Branch and Rockburn areas to provide additional capacity.						
	0 - 5 Years		Tiber / Sucker Branch Interceptor Improvements Phase 1 - A project for the design and construction of 4,034 ft of 12" to 24" supplemental sewers in the Tiber Branch and Sucker Branch areas to provide additional capacity.						

TABLE 13

IMMEDIATE, 5 YEAR, 10 YEAR AND COMPREHENSIVE PRIORITIES FOR SEWER SYSTEM DEVELOPMENT

Capital Project Number	County Priority Assigned	Coordinate Location	Description	Project Costs(\$)			Project Schedule		
				Total	PL 660 Eligibility	Local	Prel Plans	Start Const.	Compl. Const.
	6 - 10 Years		Tiber / Sucker Branch Interceptor Improvements Phase 2 - A project for the design and construction of 13,898 ft of 8" to 16" supplemental sewers in the Tiber Branch and Sucker Branch areas to provide additional capacity.						
	0 - 5 Years		Deep Run / Shallow Run Interceptor Improvements Phase 1 - A project for the design and construction of 13,713 ft of 12" to 30" supplemental sewers in the Deep Run, Shallow Branch, and Elkridge areas to provide additional capacity.						
	6 - 10 Years		Deep Run / Shallow Run Interceptor Improvements Phase 2 - A project for the design and construction of 25,919 ft of 8" to 30" supplemental sewers in the Deep Run, Shallow Branch, and Elkridge areas to provide additional capacity.						
	0 - 5 Years		MD108 Pump Station Outfall Improvements Phase 1 - A project for the design and construction of 65 ft of 24" supplemental sewer in the Tiber Branch area to provide additional capacity.						
	6 - 10 Years		MD108 Pump Station Outfall Improvements Phase 2 - A project for the design and construction of 1,586 ft of 18" to 24" supplemental sewers in the Tiber Branch area to provide additional capacity.						
	0 - 5 Years		Dorsey Run Pumping Station Upgrade - A project for the design and construction of improvements to the Dorsey Run Sewage Pumping Station and Force Main to increase the capacity.						
	6 - 10 Years		North Laurel Pump Station Parallel Force Main - A project for the design and construction of 4,603 ft of parallel force main to provide additional capacity.						
	6 - 10 Years		Rockburn Pumping Station Upgrade - A project for the design and construction of improvements to the Rockburn Sewage Pumping Station and Force Main to increase the capacity.						

	In Progress
	0-5 years (2015)
	6-10 years (2020)
	11-15 years (2025)

Table 14 has been omitted from this Report.

TABLE 15
FLOW MONITORING DATA: WASTEWATER TREATMENT PLANTS

Service Area	Design parameters (permit)					Flow (mgd)		Development Units	
	Hydraulic (mgd)	Organic (Monthly, mg/l)						Existing	Anticipated Buildout
		BOD	TSS	Total N	TP	Average Day	Maximum Day		
Little Patuxent Water Reclamation Plant	29.0	5 (S) 30 (W)	30	304,556 lbs/yr ⁽⁵⁾	22,842 lbs/yr ⁽⁵⁾	20.1 ⁽³⁾	37.64	68,100 (R)	86,400 (R)
Patapsco Wastewater Treatment Plant	11.4 ⁽¹⁾⁽⁴⁾	165 to 251 ⁽²⁾	137 to 202	22.0 to 30.5 mg/l	3.2 to 4.4 mg/l	56 to 71	N/A	25,700 (R)	34,400 (R)

(1) The County's total share capacity for the Little Patuxent WRP is projected to be approximately 11.4 MGD.

(2) Influent flow and concentrations for the Patapsco WWTP from Year 1998 to Year 2006, from the *City of Baltimore Comprehensive Wastewater Facilities Master Plan, 2004*.

(3) Annual Average Daily Flow for Year 2010 including flow diverted to Patapsco through Route 108 Pumping Station.

(4) Annual Average Daily Flow diverted to Patapsco through Year 2035 is 6.58 mgd.

(5) For flows greater than 25 MGD, the annual maximum loading rate for phosphorus shall be based on a concentration of 0.25 mg/l, and for total nitrogen shall be based on a concentration of 3.45 mg/l.

TABLE 15A
FLOW ANALYSIS TABLE

Location Code	Subdrainage Area	Pipe Segment(s) ⁽¹⁾		Current Piping (MGD)		Improved Piping (MGD)	
		Upstream Node	Downstream Node	Flow Capacity ⁽²⁾	Peak Flow ⁽³⁾	Flow Capacity ⁽²⁾	Peak Flow ⁽³⁾
DO	DORSEY RUN PUMPING STATION	487-17	678-9686	4.58	6.64	17.79	8.02
GR1	GUILFORD RUN (LP WRP)	235-3153	235-3152	14.31	12.23	14.31	13.02
GR2	GUILFORD RUN (ANNAPOLIS JUNCTION)	1242-2	1242-1	1.00	1.40	2.00	1.45
HB	HAMMOND BRANCH	50-1100	50-1099	9.06	8.19	23.94	11.47
LP	LITTLE PATUXENT	96	504-3733	52.36	31.20	52.36	31.44
MP	MIDDLE PATUXENT	720-105	720-104	12.03	6.28	12.03	6.28
NL	NORTH LAUREL PUMPING STATION	49-1073	49-1072	3.55	3.19	5.55	4.18
PS	RT 108 PUMPING STATION	124-1447	124-1446	14.76	9.54	14.76	9.54
BB1	BONNIE BRANCH (METER)	417.101	3821-1	2.60	3.37	6.97	4.21
BB2	BONNIE BRANCH (ROCKBURN P.S.)	3696-3	3696-2A	1.50	2.34	4.72	2.43
DP1	DEEP RUN (FURNACE AVENUE METER)	4109-10	4109-11	16.39	17.92	16.39	22.51
DP2	DEEP RUN (ELKRIDGE)	22-282	22-281	1.08	1.94	2.81	2.32
DP3	DEEP RUN (SHALLOW RUN)	181-2579	181-2578	7.59	8.19	12.47	9.26
DP4	DEEP RUN (MEADOWRIDGE P.S.)	705-8968	705-8967	1.60	1.17	1.60	1.17
DP5	DEEP RUN (MONTEVIDEO METER)	580-7867	580-7866	2.00	0.84	2.00	0.84
PP	PATAPSCO PARK	N/A	N/A	N/A	N/A	N/A	N/A
SB	SUCKER BRANCH (SYLVAN METER)	1305-P69	19-69	2.53	4.26	7.89	5.16
TB1	TIBER BRANCH (MAIN ST. METER) ⁽⁴⁾	26-1048	26-1047	16.68	10.23	16.68	10.33
TB2	TIBER BRANCH (RT 40 P.S.)	32-954	32-953	1.71	1.13	1.71	1.13

Notes:

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- (1) Pipe segment(s) selected near bottom of branch. Flow conditions may vary in upstream sewer segments with changes in size and slope.
- (2) Flow capacity calculated using Manning Equation for gravity flow based on pipe size and slope from Howard County record drawings.
- (3) Peak flow are the peak instantaneous flows calculated in model using 2035 projected flow with the Event A storm event.
- (4) Excludes flow from Route 108 pumping station.

TABLE 16

SEWAGE SLUDGE GENERATION

I. Little Patuxent Water Reclamation Plant

Year	Estimated Stabilized Sewage Sludge Generation (Tons/Year, Dry Weight)	Estimated Sewage Sludge Disposal (Tons/Year, Wet tons)
2010	9,059	36,236*
2011	9,575	38,300*
2012	10,089	40,354*
2020	10,322	41,287*
2035	10,557	42,227*

- Notes:
1. Generation was determined based on average day total solids analysis of the sludge product. Sludge production of 1.15 tons per MG flow; stabilized sludge with 25% dry weight lime addition.
 2. Projections of future sludge generation are based on flow projections for the plant.
 3. * 25% cake solids

II. Deep Run Water Reclamation Plant

Year	Estimated Stabilized Sewage Sludge Generation (Tons/Year, Dry Weight)
2015	N/A
2020	N/A
2025	determined N/A
2030	N/A

TABLE 16A
SLUDGE TREATMENT AND DISPOSAL

Little Patuxent Water Reclamation Plant

A. Sludge Treatment Process:

1. PRESENT - Solids are handled by dissolved air floatation thickening, and aerated storage of waste activated sludge along with gravity thickening and mixed storage of primary sludge within an odor controlled storage tank. Dewatering of combined primary and waste activated biosolids is accomplished by centrifuge. Raw sludge cake is stabilized with lime and heat using an RDP process to produce a Class A sludge for direct land application.
2. FUTURE - Due to possible changes by the Maryland Department of the Environment (MDE) with regards to land application procedures, Howard County is investigating other alternatives for biosolids disposal such as soil blending and incineration. The production of Class A biosolids will continue; however, until a study to examine all possible alternatives is complete. Addition of a third centrifuge is currently underway for the 7th Addition.

B. Chemical Additives: Lime, Polymers. Sodium Hypochlorite is used for odor control.

C. % Solids (After Dewatering):

1. PRESENT - Filter cake 25%

D. Disposal/Utilization Methods

1. A sludge disposal contractor has been hired by the County to haul and dispose of all the sludge produced at the Little Patuxent Plant. The contractor is responsible for locating sites for land spreading the hauled sludge. The County may at its option require or

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allow the contractor to haul sludge to the County's Alpha Ridge landfill for disposal or landspreading. Lime treatment, currently being implemented, will produce a sludge product suitable for general distribution. The contractor is required to produce Class A biosolids and to develop a marketing and distribution system. As stated above, other options for disposal are also being explored.

2. The RDP process consists of heated mixers that combine sludge and lime, with mixing and heat to a temperature of 160 degrees F. The sludge then travels for 30 minutes through an oven prior to discharge to a transport vehicle. The process achieves complete pasteurization of the sludge producing Class A product suitable for marketing.

Table 17

Sewer Pumping Stations

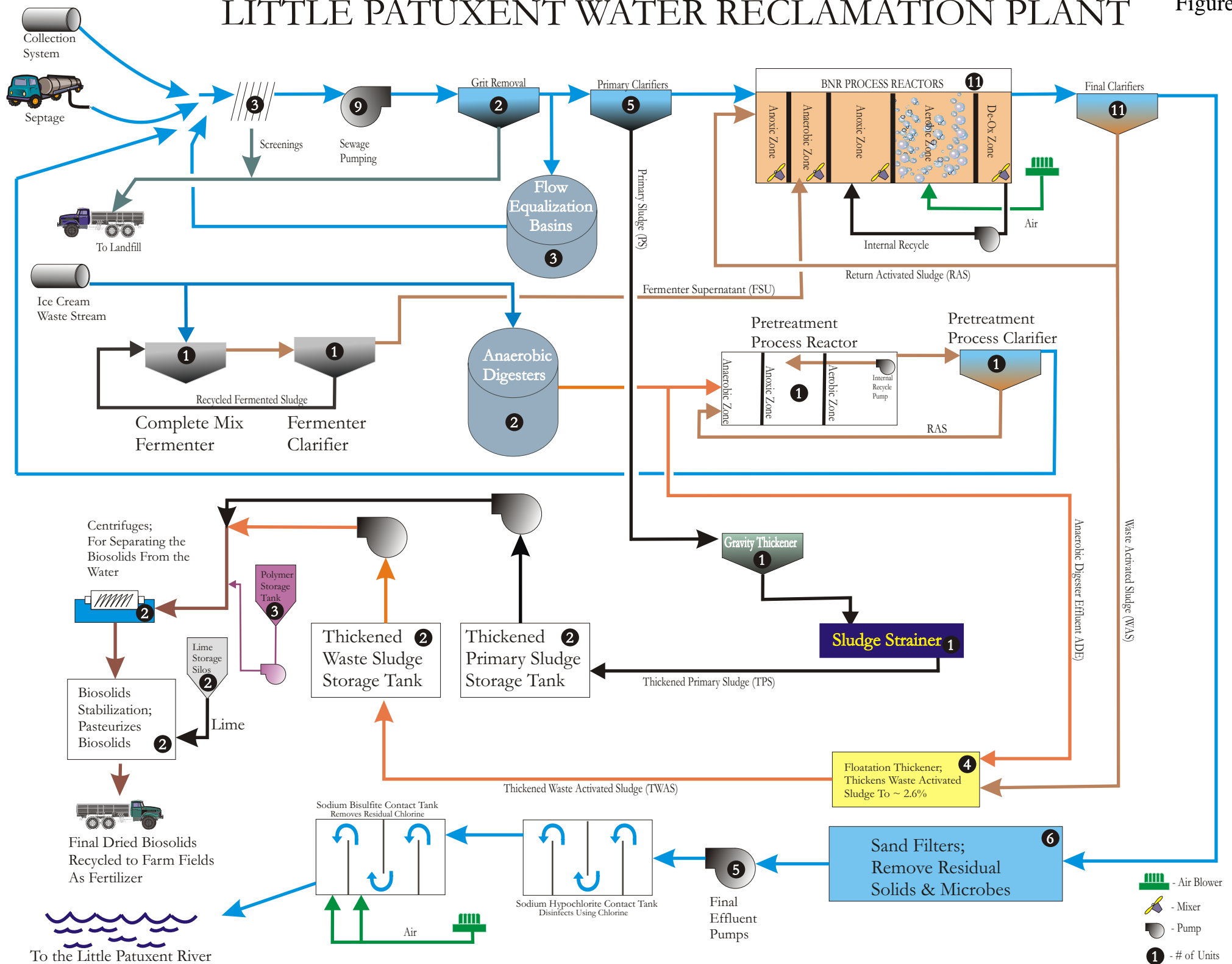
Facility Name	Road Location	ADC Map Coordinates	Existing Design Capacity ADF (mgd)	Current Average Day flows (mgd)(1)
Allenford SPS	10071 Green Clover	11H-2	0.810	0.118
Annapolis Junction	8970 Henkels	20G-10	0.280	0.013
Chamberlea	2835 Thornbrook	11K-1	0.600	0.083
Cherry Creek	11024 Scotts Landing	19B-7	0.140	0.029
Cherry Tree Farms	8409 Sweet Cherry Lane	19B-7	0.860	0.107
Church Ave	2097 Church Ave	17K-7	0.100	0.000
College Ave	College Ave	12H-12	0.300	0.028
Dorsey Run	8181 Patuxent Range Rd	16H-6	3.500	0.993
Forest Hill Drive	8100 Forest Hill Drive	12H-5	0.140	0.004
Hobsons Choice	10169 Hobsons Choice Lane	11G-1	0.110	0.000
Hollifield	2250 River Terrace Ct	12G-1	0.180	0.016
Ice Crystal Drive	8535 Ice Crystal Drive	19A-6	0.170	0.001
Kerger Rd	5357 Sunnyfield Ct	16K-5	0.720	Currently out of Service, flows captured by Rockburn SPS
North Laurel SPS	US Rt 1 and Patuxent River	19K-14	2.880	1.215
Meadowridge	7304 Meadowridge Rd	17A-11	1.010	0.015
Mt Hebron	9358 Furrow Ave	12B-1	0.680	0.117
New Cut Road	4747 New Cut	12F-12	0.520	0.038
Nottingham	7902 Nottingham	16H-1	0.100	0.000
Old Frederick	8598 Old Frederick	12D-2	0.470	0.065
Old Landing	5780 Old Landing	17D-6	0.140	0.022
Patapsco	2206 Mt Hebron	12B-2	0.860	0.129

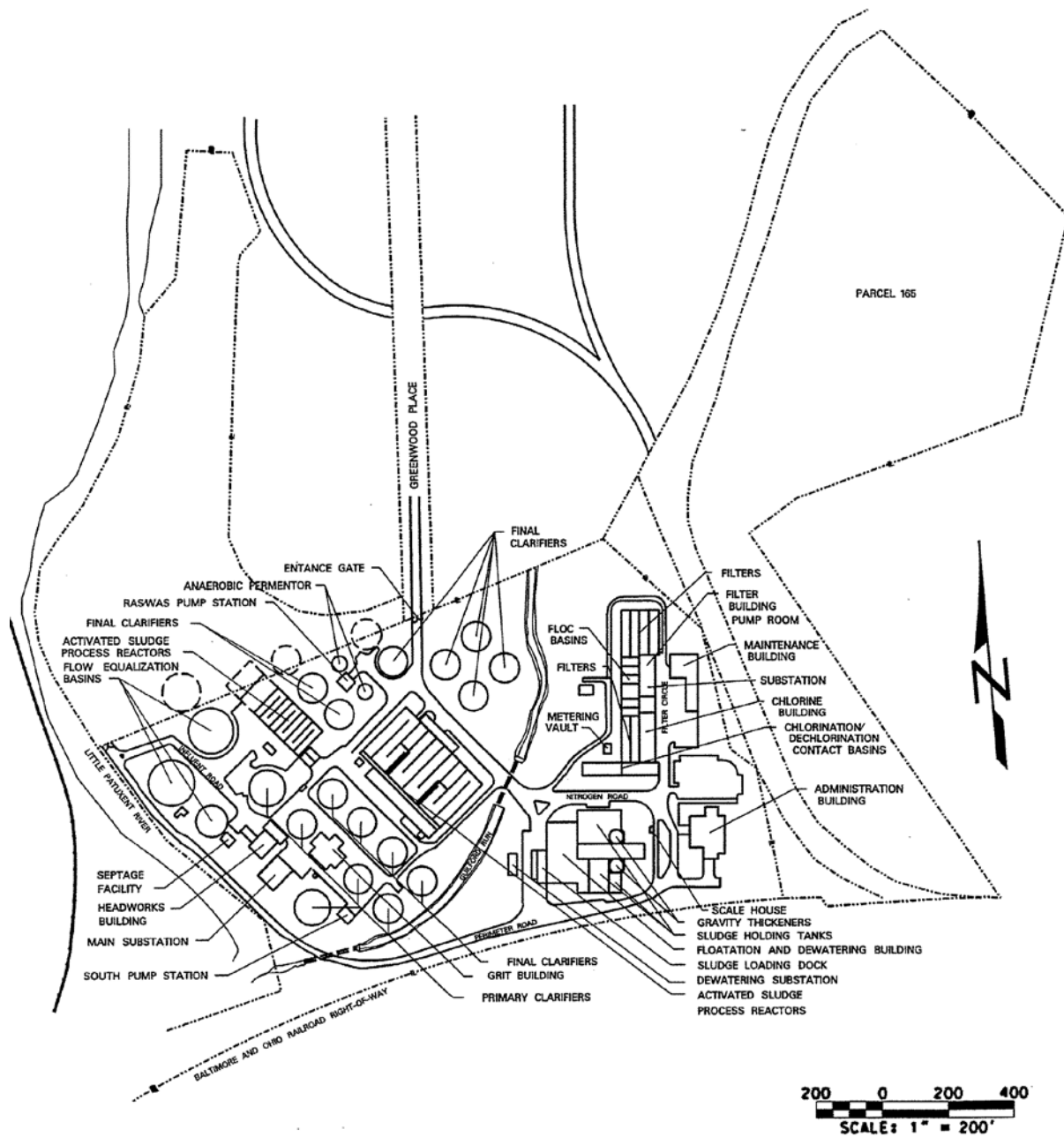
Facility Name	Road Location	ADC Map Coordinates	Existing Design Capacity ADF (mgd)	Current Average Day flows (mgd)(1)
Pine Valley	10812 Harding	19C-8	0.170	0.022
Reservoir Overlook	11300 Windsor Walk Way	19A-8	0.260	0.305
Rockburn	5390 Landing Road	17B-5	1.400	0.325
Route 40	US Rt 40 between St. Johns Lane and Chatham Rd	12B-7	1.010	0.396
Rt 108	4820 Woodland	15J-1	6.370	3.322
Tower Acres	10161 Bond Mill	19D-8	0.190	0.034
Valley Lane	8101 Valley Lane	12G-5	0.140	0.007
Waverly	15599 Dorchester	11F-1	0.900	0.938
Willow	8567 Willow Wisp	19C-7	0.140	0.020
Proposed				
Daniels (2) stations		12F-2		
Autumn River SPS		12H-11		
College Ave (2) stations		12H-11		
Rocky Gorge (2) stations		18K-8		
Church Lane		12F-4		
Ilchester Road		11F-5		
Lawyers Hill (2) stations		17H-5		

Notes:

1) FY2010 flows

Figure 17





LITTLE PATUXENT WATER RECLAMATION PLANT

Figure 18